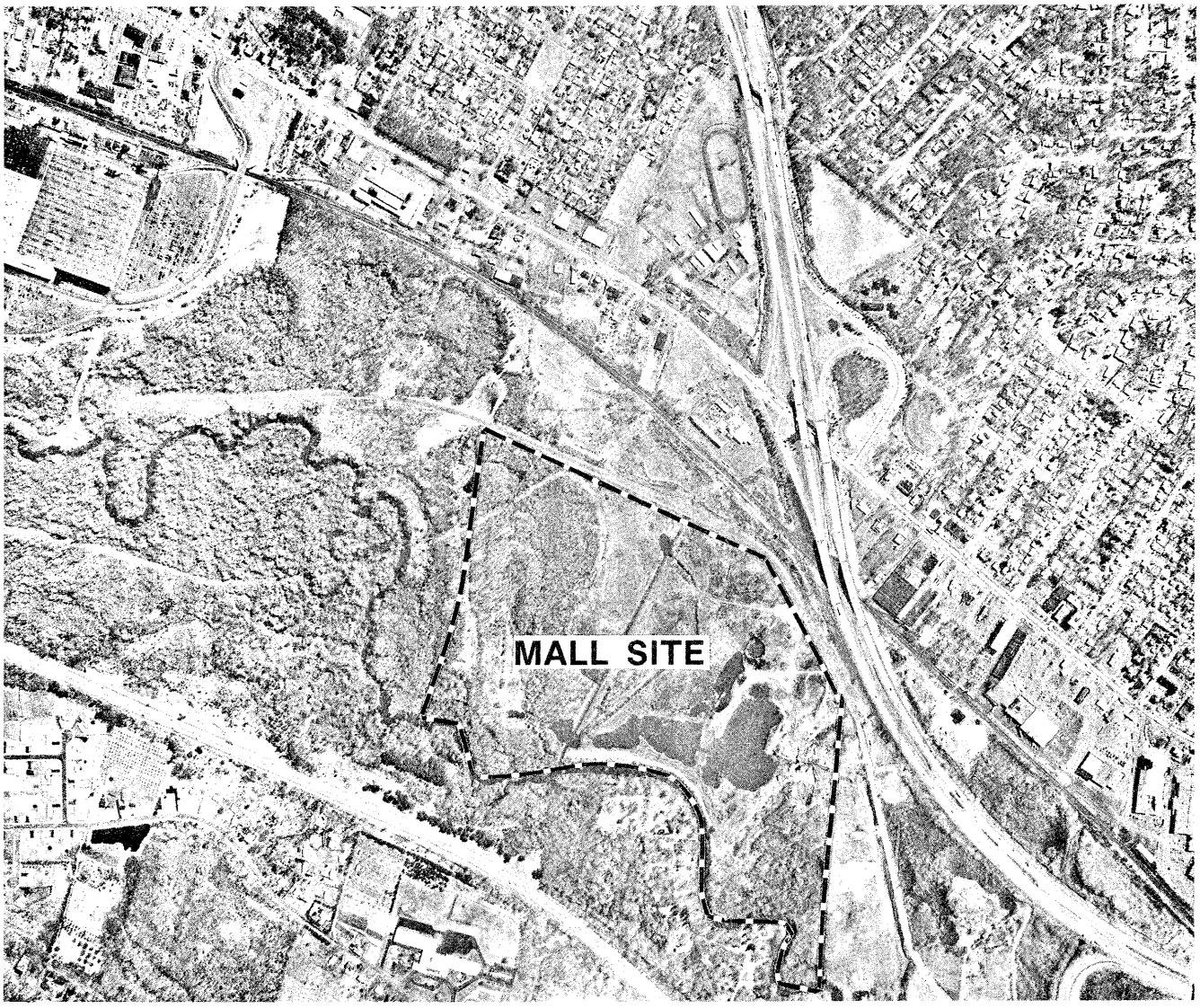
APPENDIX J
Noise
APPENDIX K
Utilities

NORTH HAVEN MALL

NORTH HAVEN, CONNECTICUT



1981

US Army Corps of Engineers
New England Division

Appendix J

Noise

The material contained in this appendix was prepared for Mall Properties, Inc., by Raymond Keyes Engr. in association with Parsons Brinkerhoff Quade and Douglas, Inc. It has been provided to the Corps of Engineers as information in support of application #13-79-561 for a permit under Section 404 of the Clean Water Act of 1977, and Section 10 of the River and Harbor Act of 1899.

APPENDIX J:

NOISE

TABLES

ILLUSTRATIONS

APPENDIX J:

NOISE

INTRODUCTION

In recent years, both government and the public have become increasingly aware of noise, particularly traffic-generated noise, as an environmental pollutant to be evaluated in determining the environmental impact of major projects. Noise pollution in a suburban area comes from numerous sources. Some of these are by-products of activities essential to the health, safety, and welfare of the town's inhabitants: noise from emergency vehicle sirens, from garbage collection operations, and from construction and maintenance equipment. Other sources, such as traffic, are by-products of the movement of people and goods, activities that are essential to the viability of a town as a place to live and do business. Although these and other noise-producing activities are necessary to a town, the noise they produce is sometimes undesirable. At certain levels, noise detracts from the quality of the living environment, and there is increasing evidence that excessive noise represents a threat to public health.

The effects of excessive noise are of three principal types: physiological effects, such as hearing loss and the accumulated effects of prolonged sleep loss; behavioral effects, such as interference with speech, learning, and sleep; and subjective effects, described by such words as annoyance, nuisance, dissatisfaction, and disturbance.

A detailed analysis has been performed to assess the impact of the proposed North Haven Mall on community noise levels. Since the noise generated by the Mall's stores would be well within normal levels comparable to offices or homes, the primary analysis concentrated on noise that would be generated by vehicular traffic traveling to and from the North Haven Mall. In general, the relatively low exterior noise levels generated by non-transportation sources, such as roof-mounted ventilation fans, refrigeration compressors, cooling equipment, and conversation, would be masked by transportation noise (e.g., more than 10dB below ambient transportation noise at a given receptor) and consequently have not been analyzed. The analysis comprised the following elements:

- Determination of existing (1980) noise levels;
- Determination of future (1985) noise levels without the North Haven Mall (the "no-build" case);
- Determination of future (1985) noise levels with the North Haven Mall (the "build" case);
- Comparison of the build results with the no-build results; and
- Comparison of the build results with relevant noise criteria.

Present noise levels were determined and future noise levels were estimated for a number of representative locations in the study area. This study area was chosen on the basis of the traffic estimates summarized in Appendix H: Transportation, and is the area that would be most affected by motor vehicle activity associated with operation of the Mall. It should also be borne in mind that "worst case" traffic conditions were assumed.

Ways to Measure Noise

A number of factors affect sound as it is perceived by the human ear. These include the actual acoustical energy level of the sound (or noise), the frequencies involved, the period of exposure to the noise, and changes or fluctuations in the noise levels during exposure. Levels of noise are measured in units called decibels. Since the human ear cannot perceive all pitches or frequencies (e.g., extremely low or high frequencies) equally well, these measures are adjusted or weighted to correspond to human hearing by discounting the extremely low and high frequencies. This adjusted unit is known as the A-weighted decibel, or dBA. Table 1 illustrates noise levels from typical fluctuating and nonfluctuating noise sources, based on the A-weighted decibel measure of noise.

Since dBA describes a noise level at just one moment and very few noises are constant, other ways of describing noise over extended periods are needed. One way of describing fluctuating sound is to describe the fluctuating noise heard over a specific time period as if it had been a steady, unchanging sound. For this condition, a descriptor called the equivalent sound level, L_{eq}, can be computed. L_{eq} is the constant sound level that, in a given situation and time period (e.g., 1 hour = $L_{eq(1)}$; or 24 hours = $L_{eq(24)}$), conveys the same sound energy as the actual time-varying sound.

Alternatively, it is often useful to account for the difference in response of people in residential areas to noises that occur during sleeping hours as compared to waking hours. One method of accounting for the difference between daytime and nighttime exposure is to apply a weighting factor to the

nighttime noise. A descriptor, the day-night noise level, $L_{dn,}$ defined as the A-weighted average sound level in decibels during a 24-hour period with a 10 dB weighting applied to nighttime sound levels, is a widely used indicator for such evaluations. L_{dn} has been proposed by the United States Environmental Protection Agency (EPA) as well as other agencies and organiza-tions as one of the most appropriate criteria for estimating the degree of nuisance or annoyance that increased noise levels will cause in residential neighborhoods.

For purposes of this project, the maximum one-hour equivalent sound level ($L_{eq\ (1)}$), the 24-hour equivalent sound level ($L_{eq\ (24)}$), and the day-night noise level (L_{dn}) have been selected as the noise descriptors to be used in the noise impact evaluation. Maximum one-hour equivalent sound levels were used to provide an indication of highest expected sound levels during hours of peak operation of the North Haven Mall. The $L_{eq\ (24)}$ and L_{dn} sound levels were determined to permit direct comparison against noise levels iden-tified by the EPA as requisite to protect public health and welfare, and to provide an indication of the project's impact on residents of the area anticipated to be affected by traffic associated with operation of the Mall.

Noise Standards

While there are presently no applicable federal or state community noise standards, noise levels associated with operation of the Mall's mechanical ventilation and air conditions system, however, are subject to the emission source provisions of the Noise Control Act of 1972.

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Table 1
Typical Noise Levels

dBA L_{10}	Fluctuating Noises	dBA	Non-Fluctuating Noises (a)
120	Rock Band	120	
110		110	Jet Aircraft at 1000 feet
100	Inside Subway Train—New York City	100	Full Throttle Diesel Truck at 20 feet
90		90	Full Throttle Diesel Truck at 50 feet
	Noise Urban Daytime		Freeway Diesel Truck at 50 feet, 60 mph
80	Shouting at 3 feet	80	Medium Truck at 20 feet, 30 mph
			Food Blender at 3 feet
70	Exterior FHWA* Design Noise Level	70	Auto at 20 feet, 30 mph
	Normal Speech at 3 feet		Dishwasher at 3 feet
60	Quiet Urban Daytime	60	Auto at 20 feet, 15 mph
	Interior FHWA Design Noise Level		Air conditioner (indoors) at 5 feet
50	Quiet Urban Nighttime	50	Dishwasher (next room)
40		40	Refrigerator at 3 feet
	Quiet Rural Nighttime		
30		30	Quiet Rural Bedroom at Night
			Concert Hall Background
20		20	
			Broadcasting Studio
10		10	
			Threshold of Hearing
0		0	

(a) Moving source noise levels are for closest points of approach.

*U.S. Federal Highway Administration

Noise Control Act of 1972. The Noise Control Act of 1972 (the Act) mandates a national policy "to promote an environment for all Americans free from noise that jeopardizes their health or welfare, ... to establish a means for effective coordination of Federal research activities in noise control, to authorize the establishment of Federal noise emission standards for products distributed in commerce, and to provide information to the public respecting the noise emission and noise reduction characteristics of such products." Section 5(a)(2) of the Act directs the Administrator of EPA to "... develop and publish criteria with respect to noise; ... publish information on the levels of environmental noise the attainment and maintenance of which in defined areas under various conditions are requisite to protect the public health and welfare with an adequate margin of safety." The noise levels identified by EPA per the requirements of Section 5(a)(2) of the Act were published in March 1974 as "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" (see Table 2). While these levels do not constitute enforceable federal regulations or standards, but rather merely represent information required to be published by the Act, nevertheless they are valid criteria for evaluating the effect of project noise on public health and welfare. Consequently, noise levels expected to be associated with the Mall will be evaluated against the EPA noise criteria.

Connecticut Noise Control Regulations. Connecticut Noise Control Regulations (approved and effective June 15, 1978) promulgated under the Connecticut Noise Pollution Act (Public Act No. 74-328, July 1, 1974) include community noise standards for various land use categories. According to the Standard Land Use Classification Manual of Connecticut, the proposed North Haven Mall would fall under land use category B which includes retail

trade areas. Sound created by any mobile source of noise, however, is excluded under Section 1.7 of the regulations, and construction noise is granted as exemption under Section 1.8. As noise levels associated with the construction and operation of the proposed North Haven Mall are mobile source related, the allowable noise levels contained in the regulations for land use/noise category B are not applicable to the proposed action.

Human Perception and Community Response to Changes in Noise Levels

Human response to changes in noise levels depends on a number of factors, including the quality of the sound, the magnitude of any changes, the time of day at which the changes take place, whether the noise is continuous or intermittent, and the individual's ability to perceive the changes. Human ability to perceive changes in noise levels varies widely with the individual, as does response to the perceived changes. However, the average ability of an individual to perceive changes in noise levels is well documented (see Table 3). Generally, changes in noise levels less than 3 dBA are barely perceptible to most listeners, whereas a 10 dBA change normally is perceived as a doubling (or halving) of noise levels. These guidelines permit direct estimation of an individual's probable perception of changes in noise levels.

Various government and research institutions have proposed criteria that attempt to relate changes in noise levels to community response. One commonly applied criterion for estimating response is incorporated into the community response scale proposed by the International Standards Organization

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Table 2
Noise Levels Identified as Requisite To Protect Public Health and Welfare With an Adequate Margin of Safety

EFFECT	LEVEL	AREA
Hearing Loss	$L_{eq(24)} \leq 70$ dB	All areas
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq(24)} \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{dn} \leq 45$ dB	Indoor residential areas
	$L_{eq(24)} \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Source: Report No. EPA-550/9-74-004, March 1974.

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Table 3
Average Ability To Perceive Changes in Noise Levels

CHANGE (dBA)	HUMAN PERCEPTION OF CHANGE
2-3	Barely perceptible
5	Readily noticeable
10	A doubling or halving of the loudness of the sound
20	A "dramatic change"
40	Difference between a faintly audible sound and a very loud sound

SOURCE: Bolt Beranek and Neuman, Inc., Fundamentals and Abatement of Highway Traffic Noise, Report No. PB-222-703. Prepared for Federal Highway Administration, -- June 1973.

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Table 4
Community Response to Increases in Noise Levels

CHANGE (dBA)	ESTIMATED COMMUNITY RESPONSE	
	CATEGORY	DESCRIPTION
0	None	No observed reaction
5	Little	Sporadic complaints
10	Medium	Widespread complaints
15	Strong	Threats of community action
20	Very strong	Vigorous community action

SOURCE: International Standards Organization, Noise Assessment with Respect to Community Responses, 150/TC 43. (New York: United Nations, November 1969.)

(ISO) of the United Nations (see Table 4). This scale relates changes in noise level to degree of community response, and permits direct estimation of the probable response of a community to a predicted change in noise level.

In order to estimate human perception of and community response to changes in noise levels that may be associated with operation of the proposed North Haven Mall, predicted increases in noise levels will be compared against the two sets of criteria described below:

- The average ability of an individual to perceive changes in noise levels (summarized in Table 3), and
- The ISO criteria for evaluating community response to increases in noise levels (summarized in Table 4).

Neither of these criteria constitutes legally enforceable noise standards, but each does represent a yardstick for evaluating the effect of project noise on the noise environment of the surrounding community.

Prediction Methodology

The sound level at a given receptor depends on several factors, the most important of which are the site geometry of the receptor location and the traffic flow past the site. Over the last few years several predictive models that relate traffic noise levels to these parameters have been developed. The FHWA Level 2 Highway Traffic Noise Prediction Model (accepted by EPA

Region I), probably the most accurate of the available models, was selected for use in this noise analysis to estimate both present and future noise levels.

Traffic Noise Prediction Model. The FHWA Level 2 Model is a modification of the TSC MOD-04 Highway Noise Prediction Code. The most significant modification is the incorporation of revised vehicle reference noise emission levels, based on statistical analysis of recent field test data (see Figure 1). The field test data used in the model were developed for vehicles operating at speeds between 30 and 60 mph. Automobile speeds less than 30 mph are interpreted by the model as 30 mph. Test data indicate, however, that automobile noise levels at vehicle speeds less than 30 mph are significantly less than the assumed 30 mph reference noise level of 62 dBA. Consequently, noise levels of automobiles traveling at low speeds are normally over-predicted by the model. Similarly, noise levels for trucks traveling at less than 30 mph were uniformly set at a conservative reference level of 87 dBA. Based on field test data, this normally represents an upper-bound noise level for trucks. Since vehicle speeds on several traffic links in the North Haven Mall impact area are less than 30 mph, predicted noise levels due to operation of the North Haven Mall are conservative upper limits to actual values. In addition, the model incorporates another conservative element: it makes no provision or allowance for expected future vehicle noise reductions due to implementation of the noise emission limitations required by the Noise Control Act of 1972. Noise emission standards required by the Act have either been promulgated or proposed for a wide variety of vehicle classifications (Table 5). The combined effect of these noise emission limitations could cause a significant decrease in community noise levels from vehicular sources

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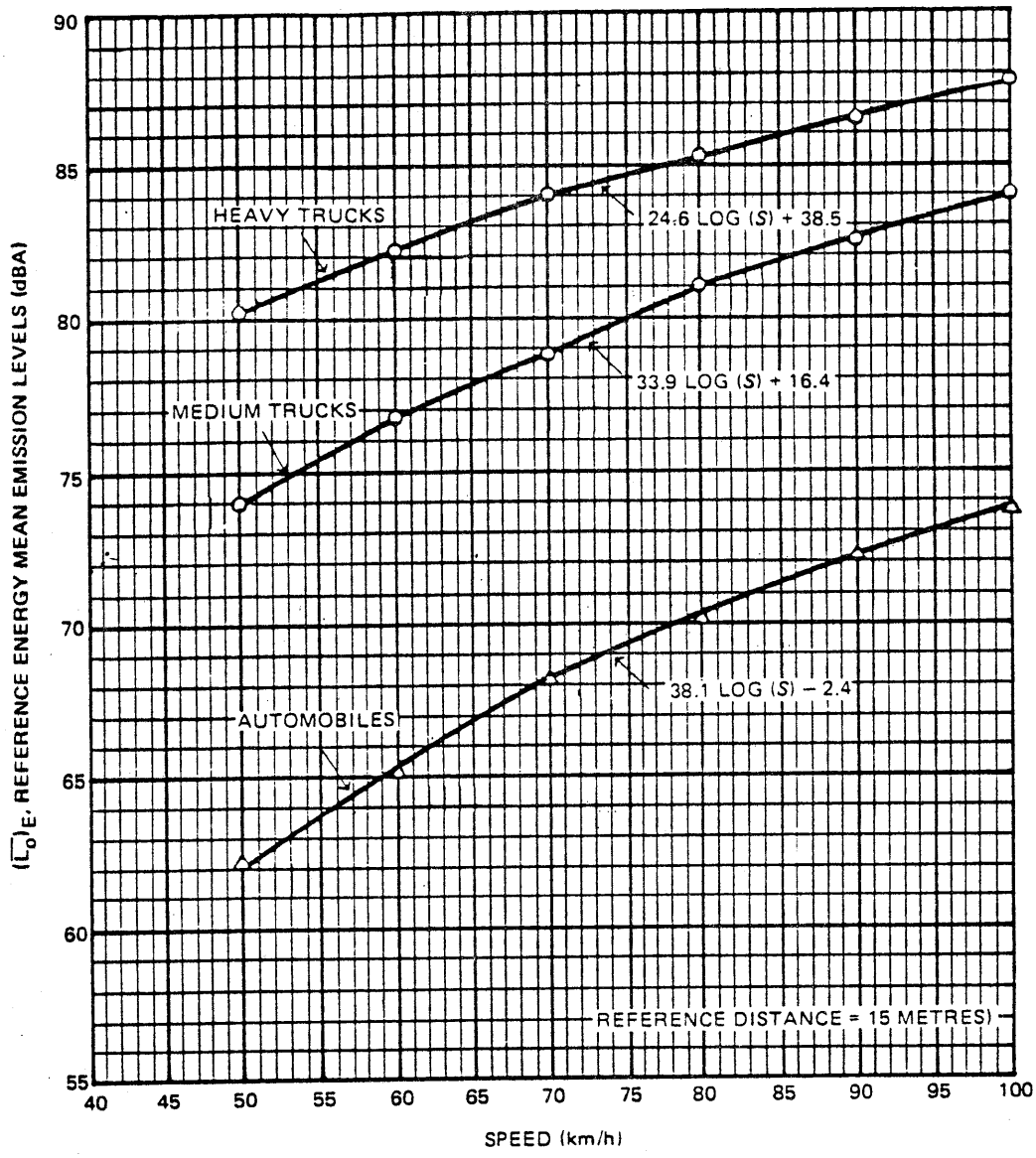
Figure 1
Reference Energy Mean Emission Levels as a Function of Speed



○ SOURCE: "Statistical Analysis of FHWA Traffic Noise Data," FHWA-RD-78-64
△ SOURCE: "Update of TSC Highway Traffic Noise Prediction Code (1974)," FHWA-RD-77-19

S = The average vehicle speed

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Table 5
Status of EPA Noise Emission Standards

Noise Source		Noise Level in dBA	Date Effective
Locomotive--Stationary			
In gear		87	December 31, 1976
Idle		70	
Moving		90	
Railroad car--Under 72 km/hr		88	December 31, 1976
Over 72 km/hr		92	December 31, 1976
Motor carriers in interstate commerce--Under		86	October 15, 1975
--Over		90	
-- Full throttle stationary		88	
Medium and heavy trucks		83	January 1, 1978
		80	January 1, 1982
Exemptions for fire trucks and mobile homes			
Portable air compressors--<250 ft^3/min		76	January 1, 1978
-->250 ft^3/min		76	July 1, 1978
[a]Crawler tractors	20-199 HP	77	March 1, 1981
		74	1984
	20-450 HP	83	1981
		80	1984
[a]Wheel loaders	20-249 HP	79	1981
		76	1984
	250-500 HP	84	1981
		80	1984
[a]Wheel tractors	20+ HP	74	March 1, 1981
[a]New truck-mounted solid waste compactors		78	January 1, 1979
		75	1982
[a]Exterior bus noise		83	January 1, 1979
		80	1983
		77	1985
[a]Interior bus noise		86	1979
		83	1983
		80	1985
[a]Street motorcycles		83	January 1, 1980
		80	1982
		78	1985
[a]Moped-type		70	1980
Offroad below 170 cc		83	1980
		80	1982
		78	1985
[a]Offroad above 170 cc		86	1980
		82	1983

[a]Proposed

by 1985. Future noise levels are therefore expected to be below most of the values predicted in this analysis. Furthermore, the traffic data used in the 1985 Mall analysis assumes full Mall operation which would not be reached for 3 to 5 years. The community noise analysis which follows is therefore quite conservative.

Input Data. Two types of input data are required by the noise prediction model:

- o Traffic data, and
- o Roadway-receptor site configuration.

Traffic data were based on hourly 1979 traffic counts conducted by CONNDOT and adjusted for 1980 and 1985 conditions as described in the Appendix H: Transportation. Roadway-receptor site configurations were based on available mapped information from aerial surveys which was then field checked.

AFFECTED ENVIRONMENT

One-hundred-four receptor locations within the study area were selected for detailed noise analysis (see Figure 2). Site selection was based on the following criteria:

- o Projected traffic routes to and from the North Haven Mall;
- o Geographical distribution of locations within the study area;
- o Location of nearby community facilities; and

- o Location of nearby residential areas.

Existing (1980) noise levels were determined by:

- o Noise monitoring at six locations in the immediate vicinity of the North Haven Mall site; and
- o Noise level predictions at the 104 receptor locations along twenty-nine roadway sections using the FHWA highway traffic noise prediction model previously described.

Noise Model Predictions for 1980

Estimated 1980 noise levels were determined for the twenty-nine roadway sections shown in Figure 2 using the noise prediction model. The maximum hourly equivalent noise levels, $L_{eq(1)}$, for each of the 104 prediction sites varied between 60 and 90 dBA (see Table 6). Model predictions at the six representative locations in the study area where field measurements were taken were in close agreement with monitored noise levels. The monitored noise levels, however, are only random samples and do not necessarily correspond with worst case baseline traffic conditions used in this noise analysis.

Table 6 lists estimated 1980 24-hour equivalent and day-night noise levels ($L_{eq(24)}$ and L_{dn}) obtained using the noise prediction model for the 104 prediction locations. Predicted 1980 24-hour equivalent noise levels ranged from 55 to 77 dBA. Predicted 1980 day-night noise levels ranged from 58 to 81 dBA. Predicted noise levels varied directly with receptor distance, the total amount of traffic and the number of trucks at a given location.

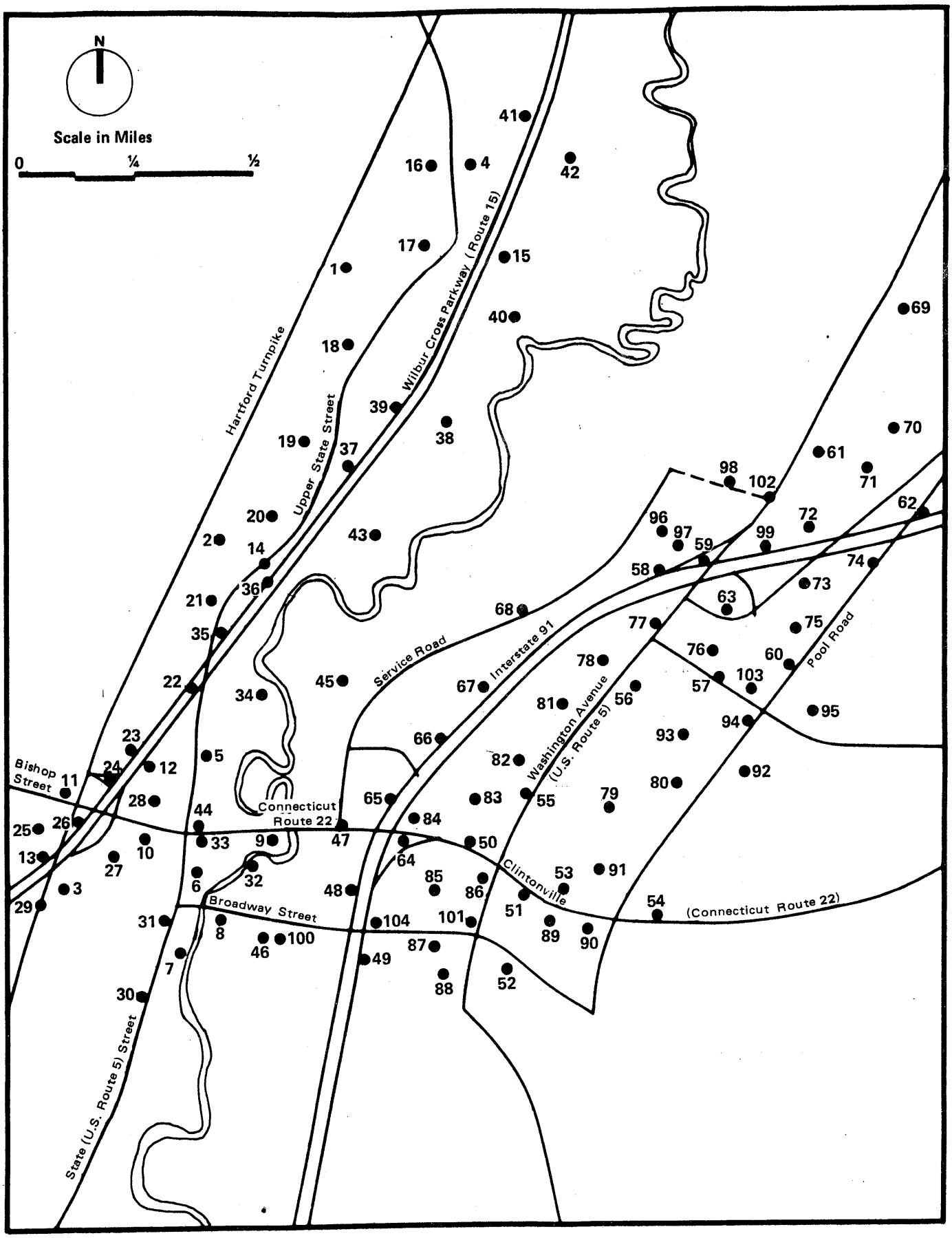

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Figure 2
Location of Noise Prediction Sites

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Table 6
Noise Level Estimates

Site No.	Location	Receptor Distance (meter)	Base Year			1985 No Build			1985 Build		
			$Leq_{(24)}$	LDN	$Leq_{(1)max}$	$Leq_{(24)}$	LDN	$Leq_{(1)max}$	$Leq_{(24)}$	LDN	$Leq_{(1)max}$
1	Hartford Turnpike	15	60	64	66	60	64	66	61	64	66
2	Hartford Turnpike	15	60	64	66	61	64	66	61	64	66
3	Hartford Turnpike	15	65	69	70	65	69	70	68	69	71
4	State Street	15	62	65	67	62	65	67	62	65	67
5	State Street	15	61	64	66	61	65	66	62	65	67
6	State Street	15	62	66	68	62	66	68	64	67	68
7	State Street	15	65	68	70	65	68	70	66	69	70
8	Broadway	15	63	67	68	64	67	68	64	67	68
9	Route 22	15	65	69	71	65	69	71	67	70	71
10	Bishop Street	15	64	68	70	64	68	70	66	69	70
11	Bishop Street	15	67	70	72	67	70	72	68	71	72
12	Route 15	15	77	80	65	77	80	80	79	81	82
13	Route 15	15	66	69	68	66	69	70	67	70	70
14	State Street	15	68	72	74	69	72	75	69	72	75
15	Route 15	15	65	68	69	65	68	69	66	69	69
16	Hartford Turnpike	120	57	60	62	57	60	62	57	60	62
17	Hartford Turnpike	156	58	61	62	58	61	62	58	61	62
18	Hartford Turnpike	168	57	60	62	57	60	62	57	60	62
19	Hartford Turnpike	168	58	61	63	58	61	63	58	61	63
20	Hartford Turnpike	156	58	61	63	58	62	63	59	62	63
21	Hartford Turnpike	84	59	62	64	59	62	64	60	63	64
22	Route 15	60	63	66	67	63	66	67	64	67	67
23	Hartford Turnpike	72	61	65	66	61	65	66	62	65	66
24	Hartford Turnpike	48	65	68	70	65	68	70	66	69	70
25	Route 15 Intersection	156	59	62	64	60	63	64	61	64	64
26	Route 15 Intersection	24	70	73	76	70	74	76	71	74	76
27	Bishop Street	108	62	65	66	62	65	66	63	66	66
28	Bishop Street	96	62	66	67	63	66	68	64	67	68
29	South of Hartford Turnpike	48	61	64	65	61	64	65	62	64	65
30	Route 5, South Broadway	84	56	59	61	56	59	61	58	60	61
31	Route 5, South Broadway	72	59	62	64	59	62	64	60	63	64
32	North of Broadway	84	59	62	64	59	62	64	60	63	64
33	Routes 15 & 22 Intersection	36	66	70	72	66	70	72	69	71	72
34	Near State Street	132	60	63	64	60	63	64	61	63	64
35	Route 15, State Street	24	67	70	71	67	70	71	68	71	71
36	Route 15, State Street	18	64	67	68	64	67	68	65	68	68
37	Near State Street	24	62	65	66	62	65	66	62	65	66
38	Near Route 15	144	58	61	61	58	61	62	59	62	62
39	Near Route 15	84	62	65	66	62	65	66	63	65	66
40	Near Route 15	132	58	61	62	59	62	62	59	62	62
41	Near Route 15	132	60	62	63	60	63	63	60	63	63
42	Near Route 15	156	59	61	62	59	62	62	59	62	62
43	Near Route 15	132	59	62	63	60	63	63	60	63	63
44	North of Route 22	36	64	68	70	64	68	70	66	69	70
45	Northwest of Service Road	336	55	58	60	56	59	60	56	59	60
46	Broadway	15	69	73	74	70	75	75	71	75	75
47	Route 22	15	70	74	76	71	76	77	72	76	78
48	Interstate 91	15	69	75	76	73	78	79	73	78	79
49	Interstate 91	15	73	78	80	76	82	83	77	82	83
50	Route 22	15	71	76	77	72	77	78	73	77	78
51	Washington Avenue	15	73	77	77	74	78	77	74	78	77
52	Church Street	15	63	67	68	65	69	70	65	69	70

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Table 6
Noise Level Estimates (Continued)

Site No.	Location	Receptor Distance (meter)	Base Year			1985 No Build			1985 Build		
			$Leq_{(24)}$	LDN	$Leq_{(1)max}$	$Leq_{(24)}$	LDN	$Leq_{(1)max}$	$Leq_{(24)}$	LDN	$Leq_{(1)max}$
53	Clintonville	15	67	71	73	68	72	74	69	72	74
54	Clintonville	15	70	74	76	71	74	77	71	75	76
55	Washington Avenue	15	65	70	71	67	72	73	68	73	73
56	Interstate 91	15	70	75	75	71	76	77	72	76	77
57	Interstate 91	15	66	70	72	68	72	74	68	73	74
58	Interstate 91	15	73	78	80	77	82	83	77	82	83
59	Washington Avenue	15	69	74	75	72	77	78	72	77	78
60	Pool Road	15	63	68	69	65	70	71	66	70	71
61	Route 5	15	67	72	72	68	73	74	69	73	73
62	Interstate 91	15	70	76	77	74	79	80	74	79	80
63	Ramp Off Interstate 91	15	70	75	77	73	78	79	73	78	79
64	Ramp Off Interstate 91	15	71	77	77	74	79	80	74	79	80
65	North Interstate 91	36	70	75	77	73	78	79	74	79	79
66	Along Interstate 91	60	68	74	75	72	77	78	72	77	78
67	Along Interstate 91	132	66	71	73	69	75	76	70	75	76
68	Near Service Road		64	69	71	67	73	74	69	73	74
69	North End of Route 5	216	64	69	69	65	70	69	66	70	69
70	North End of Route 5	252	60	66	66	63	68	69	63	68	69
71	North End of Route 5	120	63	69	70	66	72	73	67	72	73
72	East of Mall Drive	60	66	72	73	69	75	75	69	75	75
73	North End Interstate 91	24	70	75	77	74	79	80	74	79	80
74	Pool Road, Interstate 91	144	65	70	71	68	73	74	68	73	74
75	Near Pool Road	96	64	70	71	68	73	74	68	73	74
76	Near Blakeslee	36	67	70	73	70	75	76	70	75	76
77	Blakeslee, Washington Ave.	120	69	72	76	72	78	79	73	78	79
78	Along Interstate 91	192	68	74	75	71	77	78	72	77	78
79	Thorpe Street	144	62	66	68	64	69	70	64	69	70
80	George Street	144	61	66	67	63	68	69	64	68	69
81	Along Interstate 91	144	67	68	74	71	76	74	71	77	77
82	Off Washington Avenue	144	67	72	73	70	75	76	70	76	76
83	Along Interstate 91	120	67	73	74	71	76	77	71	76	77
84	Interstate 91, Route 22	30	76	81	82	79	84	85	80	84	85
85	Peck Street	144	65	70	71	68	73	74	69	73	74
86	Washington Ave.@ Route 22	48	66	70	72	68	73	73	68	73	74
87	South of Broadway	24	67	72	72	69	73	74	69	74	74
88	South of Broadway	120	64	69	70	67	72	73	68	72	73
89	North of Broadway	60	62	66	68	64	69	69	64	69	69
90	South of Clintonville	36	61	65	67	63	67	68	63	67	68
91	South of Thorpe Street	156	61	66	67	63	68	69	64	68	69
92	Along Pool Road	18	70	75	74	70	73	75	70	75	75
93	Near Lincoln	240	62	67	68	65	70	71	65	70	71
94	Along Pool Road	24	65	69	70	66	70	72	66	71	72
95	Blakeslee, Pool Road	96	62	66	68	64	68	70	64	69	69
96	Along Service Road	24	63	68	70	66	72	71	68	72	73
97	Along Service Road	84	64	69	71	67	73	74	68	73	74
98	At Mall Drive	36	62	68	69	65	70	71	66	71	71
99	South of Mall Drive	60	69	75	76	72	78	79	73	78	79
100	South of Broadway	36	62	66	67	65	69	70	65	69	70
101	North of Broadway	36	65	69	70	66	71	72	67	71	72
102	At Mall Drive	96	64	69	70	66	72	72	67	72	72
103	Near Blakeslee	108	63	68	70	66	71	70	67	71	72
104	South Interstate 91	36	67	72	73	70	75	76	71	75	76

At all receptor locations, estimated 1980 noise levels were above EPA-identified noise levels that would produce interference and annoyance with outdoor activities. At seven receptor locations in the immediate vicinity of Interstate 91, Wilbur Cross Parkway (Route 15), and Clintonville Road (Route 22), predicted noise levels were above the levels recommended by EPA as requisite to protect against loss of hearing. These results are typical of suburban areas such as North Haven and do not reflect any peculiar characteristics of the study area.

ENVIRONMENTAL CONSEQUENCES

Operational Impacts

Using the noise prediction model, future (1985) noise levels were determined for the 104 prediction locations for both the build and no-build situations.

Estimated 1985 24-hour equivalent noise levels ($L_{eq(24)}$) and day-night noise levels (L_{dn}) for each receptor location for the build and no-build cases are listed in Table 6. As indicated previously, $L_{eq(24)}$ and L_{dn} were determined to permit direct comparison against EPA-identified levels requisite to protect the public health and welfare.

Estimated future noise levels, both with and without the North Haven Mall, were not significantly different from existing noise levels. For both the build and no-build cases, estimated noise levels exceeded the EPA-identified noise levels requisite to protect against annoyance or interference with outdoor activities at all receptor locations. Furthermore, the EPA-identified noise level to protect against hearing loss was exceeded at 25 of the 104

receptor locatons with the Mall and 21 of the 104 receptor locations without the Mall. Again, these estimates are consistent with noise level predictions found in other studies of the outdoor noise environment of the United States. The overall exceeding of the EPA-identified noise levels found in this and other studies reflects a nation-wide noise problem unrelated to the operation of the Mall.

To assist in estimating the potential community response to noise levels that would result from Mall traffic, changes in predicted 1985 $L_{eq(24)}/L_{dn}$ levels (the difference between build and no-build noise levels) were compared with the criteria for estimating the average ability of an individual to perceive changes in noise levels (Table 3), and with ISO community response criteria (Table 4). Increases in noise levels due to operation of the Mall would be 3 dBA or less at all 104 receptor locations. Based on the criteria for estimating average human perception of changes in noise levels, these increases would be "barely perceptible." Based on the ISO community response criteria, increased noise levels for peak situations due to operation of the Mall would be unlikely to cause any response from the surrounding community.

Since both $L_{eq(24)}$ and L_{dn} are measures of estimated average daily noise levels, both measures are relatively insensitive to short-term (hourly) changes in noise levels. In order to estimate these short-term impacts, hourly equivalent noise levels ($L_{eq(1)}$) were estimated for both the no-build and build cases The maximum $L_{eq(1)}$ for each of the 104 prediction sites for the build case varied between 62 dBA and 85 dBA. Maximum increases in equivalent hourly noise levels, ($L_{eq(1)}$), for the 1985 build (as compared with the 1985 no-build case) were obtained by examining each hour of the day separately.

With the exception of Sites 10 on Bishop Street, 61 and 69 on Washington Avenue, 68 on the Service Road, and Sites 46 and 98 on Mall Drive, the maximum increase in hourly equivalent noise levels at all prediction sites would be 3 dBA or less, a barely perceptible or noticeable noise increase. At Sites 10 on Bishop Street, 61 and 69 on Washington Avenue, 68 on the Service Road, and Sites 46 and 98 on Mall Drive, maximum increases in hourly equivalent noise levels would range from 4 to 5 dBA, a perceptible and noticeable increase. With the exception of Site 10 on Bishop Street, these sites, however, are located in nonresidential areas where the increases in hourly equivalent noise levels would constitute a relatively insignificant impact.

Construction Impacts

Impacts on community noise levels during construction of the Mall include:

- Noise from construction equipment.
- Noise from construction vehicles and delivery vehicles traveling to and from the Mall site.

The level of impact of these noise sources depends upon the noise characteristics of the equipment and activities involved, the construction schedule, and the location of potentially sensitive noise receptors.

Noise levels at a given receptor location are dependent on the type and number of pieces of construction equipment being operated, as well as the distance from the construction site. Typical uncontrolled noise levels of construction equipment expected to be employed during the construction

process are given in Table 7. Noise levels due to construction activities would vary widely depending on the phase of construction (utility relocation; land clearing and excavation; foundation and capping; erection of concrete superstructure, structural steel, and space frame; construction of exterior walls; installation of mechancial systems, finishing, landscaping, and construction of the plaza), and the specific task being undertaken.

By far, the most noise intensive activity during the construction of the Mall would be the land clearing and excavation. During the peak construction period, increases in noise levels due to operation of construction related vehicles would be found only in the immediate vicinity of the Mall site. Maximum increase in noise levels as a consequence of these truck operations should barely be perceived by community residents along the truck routes.

Increases in noise levels during construction of the Mall are expected to be minimal since existing residences and community facilities are either far away from the construction site and would not be significantly impacted by noise generated on the site.

Noise from construction equipment is regulated and controlled by the Connecticut Noise Levels for Vehicle Regulations (Section 14-80a) and by noise emission source regulations promulgated under the Noise Control Act of 1972 (see Table 5). These local and federal requirements mandate that certain classifications of construction equipment and motor vehicles meet specified noise emission standards. Although construction noise is specifically exempted from the provisions of the Connecticut Noise Control Regulations (effective June 15, 1978), every effort would be made to limit construction

North Haven Mall
Valley Service Road
North Haven, Connecticut

Table 7
Typical Noise Emission Levels for Construction Equipment

Equipment Item	Noise Level at 50 ft. (dBA)
Air Compressor	81
Asphalt Spreader (paver)	89
Asphalt Truck	88
Backhoe	85
Bulldozer	87
Compactor	80
Concrete Plant	83*
Concrete Spreader	89
Concrete Mixer	85
Concrete Vibrator	76
Crane (derrick)	88
Delivery Truck	88
Diamond Saw	90*
Dredge	88
Dump Truck	88
Front End Loader	84
Gas-driven Vibro-compactor	76
Hoist	76
Jackhammer (Paving Breaker)	88
Line Drill	98
Motor Crane	83
Pile Driver/Extractor	101
Pump	76
Roller	80
Shovel	82
Truck	88
Tug	85*
Vibratory Pile Driver/Extractor	89*

Source: Patterson, W.N., R.A. Ely, and S.M. Swanson, "Regulation of Construction Activity Noise", Bolt Beranek and Newman, Inc., Report 2887, for the Environmental Protection Agency, Washington, D.C., November 1974, except for (*) items.

activities, except under exceptional circumstances, to weekdays between the hours of 7:00 A.M. and 9:00 P.M.. Construction material would be handled and transported, whenever possible, in such a manner as to not create unnecessary noise. In addition, the use of quieter construction equipment and procedures would be explored and, where feasible, low noise emission level equipment and operational procedures would be utilized.

Secondary and Cumulative Impacts

Secondary commercial and office development resulting from and in close proximity to a large regional shopping center typically would not result in discernible traffic impacts during the first few years of operation (see Technical Memorandum on Transportation). For this reason no discernible community noise impact would result from secondary development within the period of analysis used in this study. While there may be some traffic and hence noise impacts resulting from secondary development occuring during the 10-15 year period following the opening of the Mall, these impacts are not quantifiable at this time.

No significant traffic increases along the access routes to the Mall are projected from projects to be developed contemporaneously with the proposed Mall (see Appendix H: Transportation). Therefore, no significant cumulative impact on community noise is anticipated.

MITIGATING MEASURES

The following mitigation measures will contribute to the reduction of community noise during the construction of the Mall:

1. Construction activities would be limited, except under unusual circumstances, to weekdays between the hours of 7:00 A.M. and 9:00 P.M.
2. Construction material would be handled and transported whenever possible, in such a manner as not to create unnecessary noise.
3. Use of quieter construction equipment and procedures would be explored and, where feasible, low noise emission level equipment and operational procedures would be utilized.
4. Compliance with noise control measures would be assured by including them in contract documents as material specifications and by directives to the construction contractor.
5. Construction activities would be monitored to ensure compliance with contract provisions.

SUMMARY

Based on the relatively small increases in predicted noise levels for both the no-build and build cases, as compared to the 1980 ambient noise levels, it is expected that operation of the Mall would not have a significant

impact on the existing noise environment in the study area. For the vast majority of prediction sites, future noise levels with the Mall are not expected to be perceptibly different than future noise levels without the Mall.

The estimated overall condition of exceeding of the EPA-identified levels is a community noise problem unrelated to the operation of the Mall. Operation of the Mall is not expected to significantly affect noise levels. Prediction sites with the greatest increase in noise levels due to operation of the Mall are those locations in close proximity to the Mall site. With the exception of Site 10 on Bishop Street these locations are nonresidential in character. Increased noise levels due to operation of the Mall would have a minimal impact on established residential communities and on community facilities in the study area.

Compliance with noise control measures would be achieved by including them in the contract documents as material specifications and by directives to the construction contractor. Construction activities would be monitored to ensure compliance with contract provisions.

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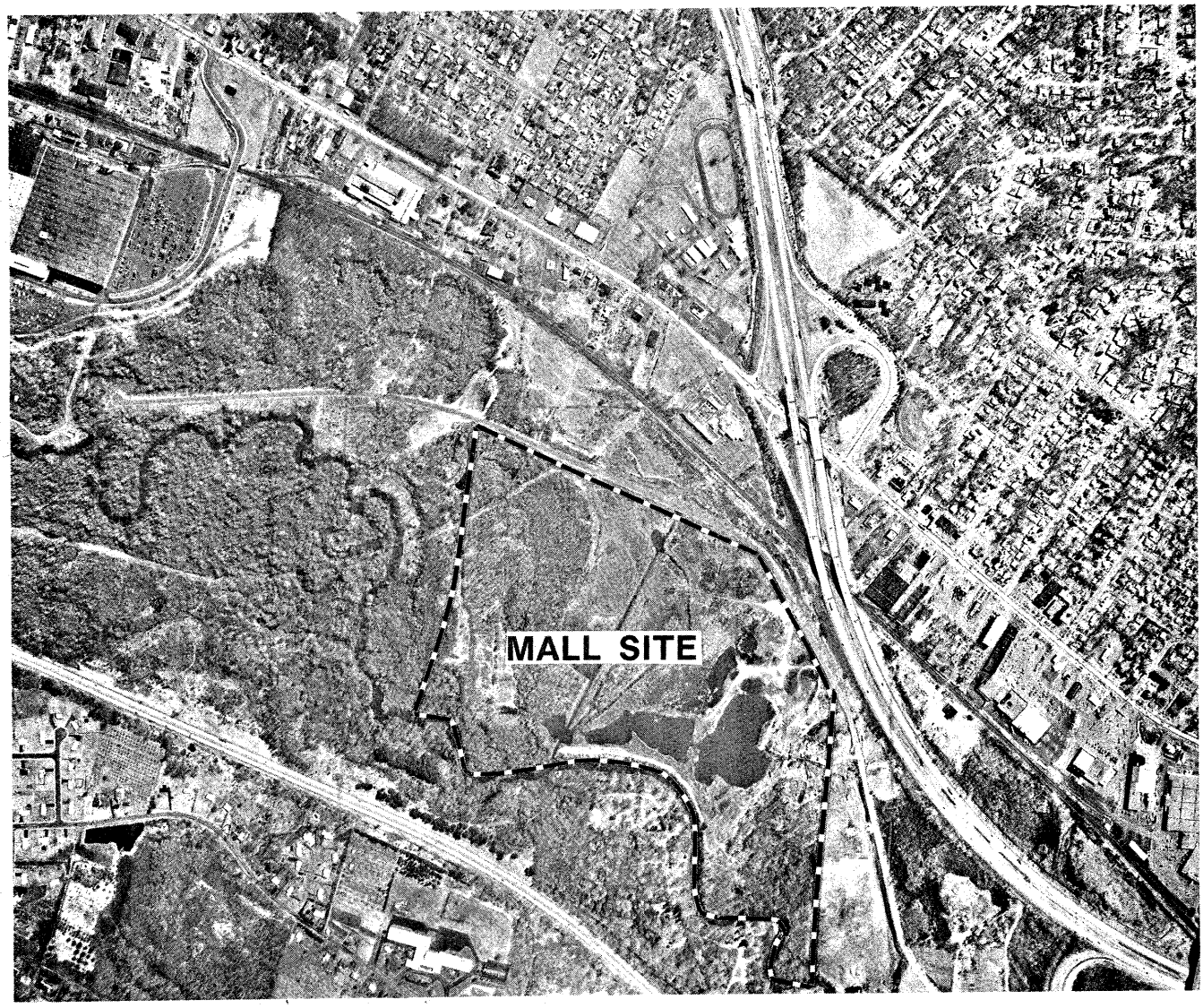
APPENDIX K
Utilities

NORTH HAVEN MALL

NORTH HAVEN, CONNECTICUT



1981

US Army Corps of Engineers
New England Division

Appendix K

Utilities

The material contained in this appendix was prepared for Mall Properties, Inc., by Raymond Keyes Engr. in association with Parsons Brinkerhoff Quade and Douglas, Inc. It has been provided to the Corps of Engineers as information in support of application #13-79-561 for a permit under Section 404 of the Clean Water Act of 1977, and Section 10 of the River and Harbor Act of 1899.

APPENDIX K:

UTILITIES

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APPENDIX K:

UTILITIES

INTRODUCTION

The proposed North Haven Mall will require utility services. This Appendix presents the analysis of the possible impacts associated with providing these services, including the possible impacts upon the level of service provided to others due to the Mall's operational use of these utilities and possible impacts due to connecting the Mall to utility services, including construction impacts.

The utilities that would be required by the Mall are:

1. Water Supply
2. Sanitary Sewage Facilities
3. Solid Waste Collection and Disposal
4. Electrical Supply and Distribution
5. Telephone Service

The analysis for each utility service is presented in the following sections.

1. WATER SUPPLY

INTRODUCTION

The proposed North Haven Mall would require public water supply for consumptive uses (sanitary waste disposal, drinking water, food preparation, etc.), and for fire protection. Impacts that may be associated with the use of public water supplies by commercial activities such as the Mall include: impacts upon the water supply capabilities of the purveyor resulting from increased average system demand; impacts upon pressure in the distribution system due to peak demands upon the system; impacts upon storage requirements due to the additional demand, particularly fire flow demands; and impacts associated with construction to provide service.

Impacts upon the water supply system due to the addition of the North Haven Mall demand are analyzed by superimposing the Mall's water use upon the existing level of service by the purveyor to determine if that service is adequate, and if current customers would suffer a reduced level of service as a result of the Mall.

EXISTING CONDITIONS

Water supply to the Mall would be furnished by the South Central Connecticut Regional Water Authority (The Authority), formerly the New Haven Water Company (the Company), located at 90 Sargent Drive, New Haven, Connecticut 06501. The Company was recently purchased by the Authority, which is now operating

all water supply facilities of the former water company. The Authority provides service to twelve (12) communities, as shown in Table 1.

TABLE 1 (1)

Name	Estimated Population Supplied	Total Customers Supplied	Total Metered Water-1979 (millions of gallons)
New Haven	129,500	22,350	6,784.6
Milford	50,542	14,662	2,012.0
Hamden	45,680	12,989	1,597.0
West Haven	51,781	12,393	1,864.6
East Haven	23,740	6,818	632.8
Branford	20,080	6,341	848.4
North Haven	21,450	6,115	1,131.2
Cheshire	17,729	4,201	600.7
Orange	9,587	2,739	313.0
No. Branford	3,384	918	86.7
Woodbridge	1,042	293	54.1
Bethany	10	5	0.4
	374,525	89,824	15,925.50

Water is supplied to the system by numerous surface water reservoirs with a total available storage volume of 18.956 billion gallons and a 95 percent dry year yield of 65.3 million gallons per day (mgd). Additionally, the system is served by subsurface supplies yielding a 95 percent dry year

quantity of 11.1 mgd, providing a total existing supply to the entire system of 76.4 mgd. The system is divided into seventeen (17) service areas, three (3) of which serve the Town of North Haven. These service areas are the Reduced Rabbit Rock Service Area, the Direct Rabbit Rock Service Area, and the New Haven Low Service Area.

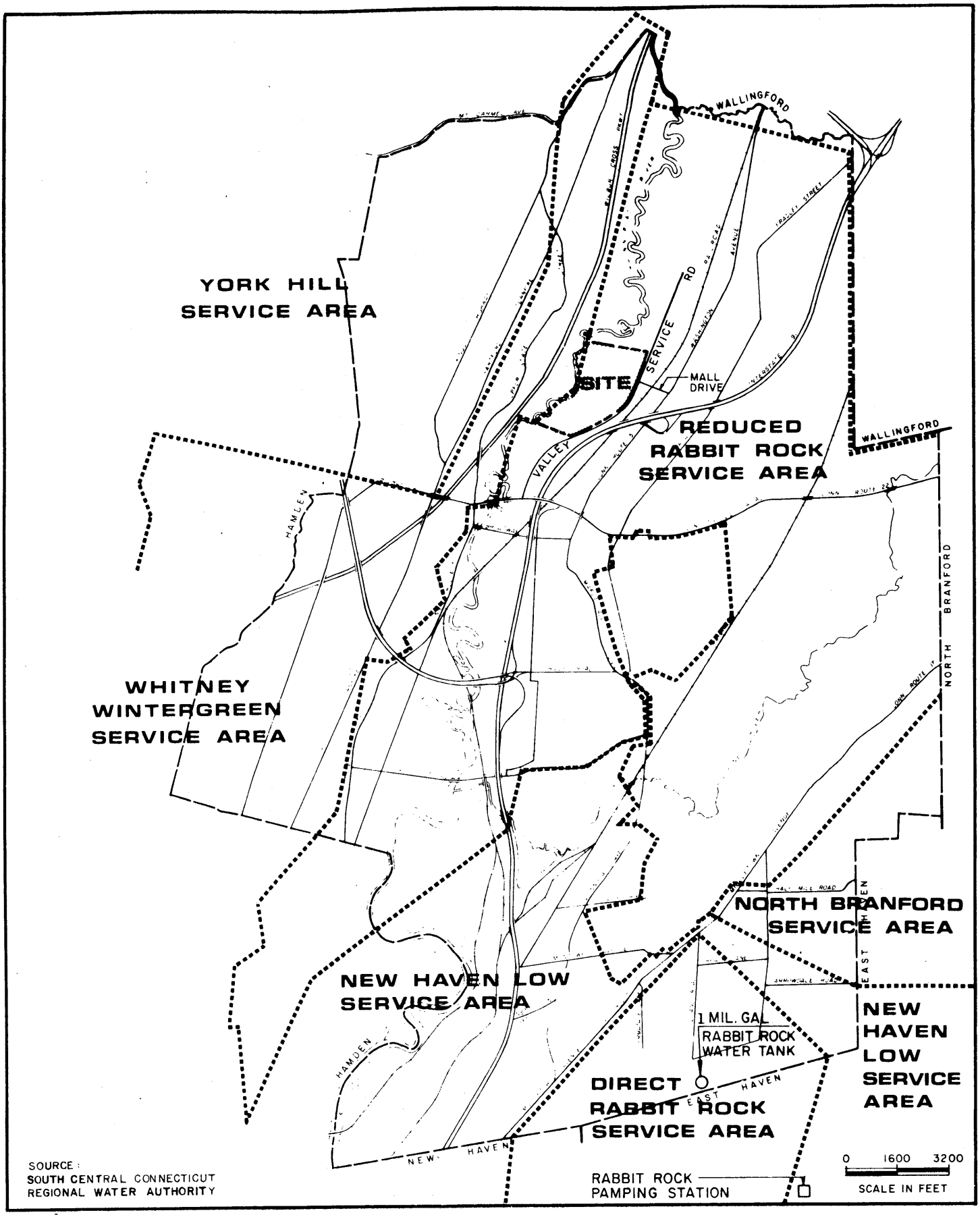
The proposed Mall site falls within the Reduced Rabbit Rock Service Area, which is served through a pump station and standpipe from the Direct Rabbit Rock Service Area (Figure 1). The Rabbit Rock Pump Station has a capacity of 9.7 mgd with the storage tank (standpipe) having a capacity of 1 million gallons.[1]

The average water use in the Rabbit Rock Service Areas (Reduced and Direct) was 2.6 mgd in 1979 with a maximum daily use of 2.9 mgd.[4]

Pressures in the Rabbit Rock Service Areas were tested[2] on May 1, 1979 at two hydrants; one at Washington Avenue and the other at the intersection of Broadway and Elm Street. The static pressures were 85 psi and 90 psi, respectively. Fire flow tests on these hydrants yielded the following results:

Hydrant	Flow Rate (gallons per minute)	Residual Pressure (pounds per square inch)
Washington Avenue	1,750	41
Broadway & Elm	2,120	75

These tests were conducted while the Rabbit Rock Service Area was supplying some 2.3 mgd compared to the average flow of 2.6 mgd; therefore, these



North Haven Mall
Valley Service Road
North Haven, Connecticut

Figure 1
Water Service Areas

pressures are typical of what can be expected during a fire in this service area.

PROPOSED ACTION

The proposed action consists of construction of a Mall with four major department stores and their associated parking and site improvements on a 117.5 acre property in the Town of North Haven. The site is located east of the Quinnipiac River, some 3,200 feet north of Route 22 (Figure 1). The site is bounded to the west by the Quinnipiac River, to the east by the Valley Service Road (Stillman Road), on the south by an active sand and gravel operation, and on the north by largely vacant land.

Water supply to the proposed Mall would be provided by a 24-inch diameter main running from Broadway along the Valley Service Road to Mall Drive, an access road that would be constructed as a part of this proposed project. The 24-inch main would connect to an existing 10-inch water main on Washington Avenue at Mall Drive, creating a new loop in the Reduced Rabbit Rock Service Area. (Figure 2)

Water use for the Mall was estimated based upon experience of other malls of similar size and character. A conservative estimate of water use is an average use of 0.1 gallons per square foot of Gross Leasable Area, resulting in an average water demand of 112,000 gpd. Based upon a 12 hour use period and a peaking factor of 2.5, the peak demand rate of flow is estimated to be 560,000 gpd (389 gpm).

In addition to the normal water use at the Mall, the water system would provide fire protection for the Mall. It has been determined by a potential insurer of the Mall and the department stores that a fire flow of 1,100 gpm at a residual pressure of 60 psi is required for fire protection at the first floor level (Elevation 16).[3] It is also generally required that the fire flow be available for a period of 90 minutes.

IMPACT ASSESSMENT

The possible impacts on the Rabbit Rock Service Area from connection of the Mall are:

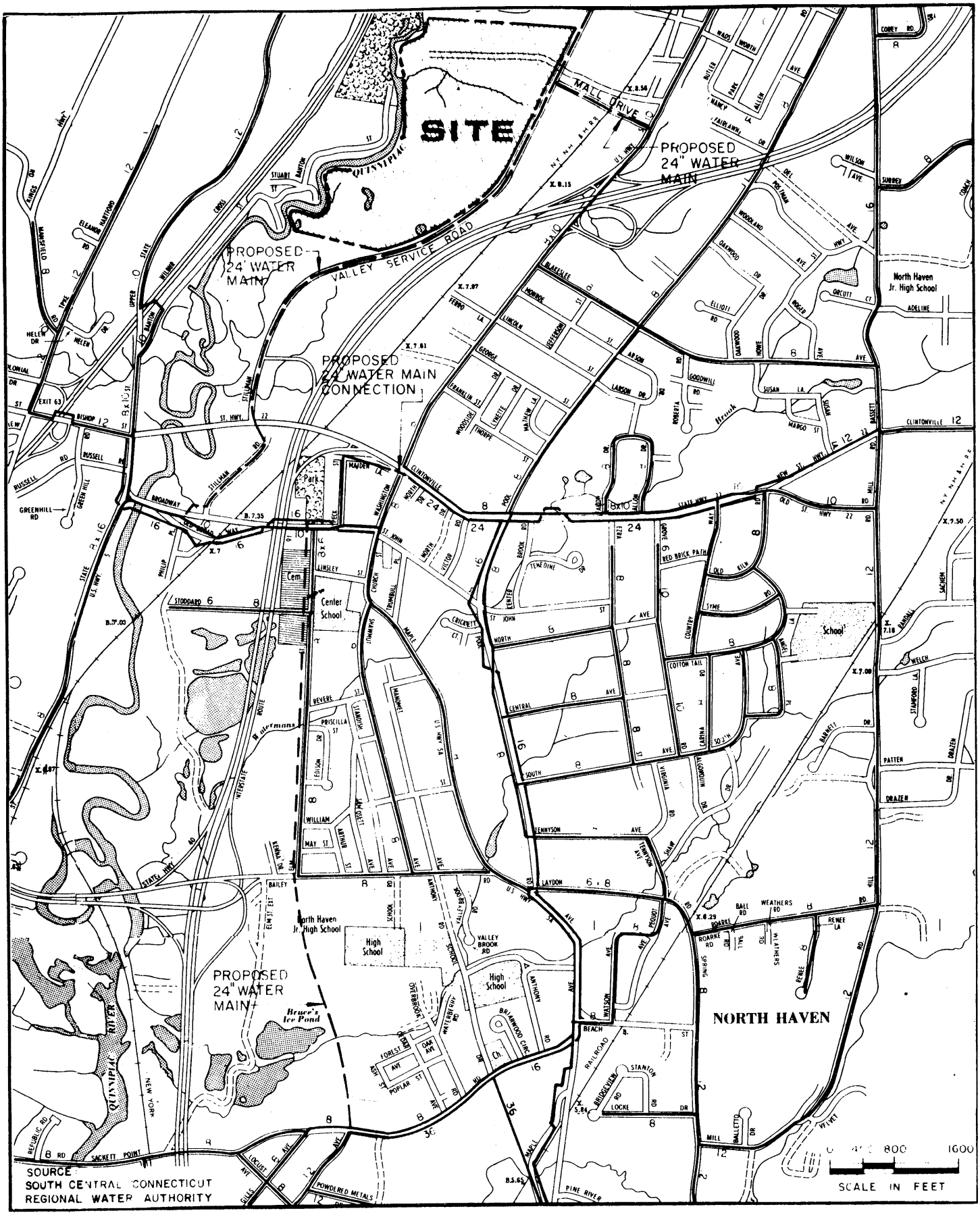
(1) Impact of average water use upon system capacity to deliver water during dry weather conditions;

(2) Impact of peak daily demand upon local water pressures;

(3) Impact of fire flows upon system storage requirements and pressure; and

(4) Construction impacts on the system related to service connection of the Mall, or improvements to the system required to serve the Mall;

Following are the assessment of impacts for each of these areas.



North Haven Mall
Valley Service Road
North Haven, Connecticut

Figure 2
Existing and Proposed Water Facilities

(1) Impacts on System Capacity

The average water demand of 112,000 gpd represents an increase in demand of 4.3 percent on the entire Rabbit Rock Service Area, a 3.6 percent increase in demand in the North Haven Service Area and a 0.03 percent increase in demand on the entire water system. The available supply of the Rabbit Rock Service Area is 9.7 mgd, with current average use of 2.6 mgd. There is, therefore, an excess average supply capacity of 7.1 mgd in this system, of which the Mall would utilize only 1.6 percent. In addition, the entire water system has dry weather average excess capacity (supply capacity above average system demand) of 32.8 mgd; therefore, the additional demand of 0.112 mgd would not affect the ability of the water system to service all customers, even during dry weather conditions.

(2) Impact Upon System Pressure

The static pressures of the Rabbit Rock Service Area were measured at 85 to 90 psi in the vicinity of the Mall. Minimum acceptable pressures for domestic use is 20 psi; therefore, the system currently has adequate pressures. During fire flow tests, flows of 1,750 and 2,120 gpm resulted in residual pressures of 41 and 75 psi at Washington Avenue and Broadway, respectively. Since the peak demand (exclusive of fire flow demand) of the mall is conservatively estimated at 389 gpm, system pressures would be well above the minimum of 20 psi. Therefore, it is concluded that operation of the mall would not adversely affect water pressures in the Town of North Haven.

(3) Impacts Due to Fire Flows

To provide a more reliable fire service to the Mall and, in fact to the entire Rabbit Rock Service Area, improvements to the system were suggested by the water company (Figure 2). These improvements would connect the Reduced Rabbit Rock Service area to the New Haven Low Service Area (a portion of the North Branford System), thus providing the system with gravity feed.

The interconnection of the Reduced Rabbit Rock Service Area to the New Haven Low Service Area would be made by a 24 inch main from the 36 inch main on Sackett Point Road to the 16 inch main at the intersection of Broadway and Elm Street, and by the interconnection of an 8 inch and 24 inch main along Clintonville Road, just east of Washington Avenue. The interconnection from Sackett Point Road would run along the Elm Street extension, a road improvement not associated with the Mall planned by the Town of North Haven, and the existing Elm Street.

The improvements to the Rabbit Rock Service Area achieved by these interconnections would provide full gravity flow through Lake Gaillard (13 billion gallon storage capacity) and other portions of the North Branford system. This system has a 95 percent dry year yield of 35.0 mgd and a total storage of 14.3 billion gallons. The average total use of the North Branford system is 33.8 mgd, with an excess average capacity above yield of 1.2 mgd. An additional supply capacity of 17.4 mgd (95 percent dry year yield) can be fed into this system on a back-up basis. These additional back-up supplies have current average demands of approximately 9 mgd, leaving an average excess of 8 mgd available for use in supplementing the Reduced Rabbit Rock interconnection.

With the interconnection of the Reduced Rabbit Rock Service Area to the New Haven Low system, fire flows can be supplied to the mall without any impact on other customers. Additionally, this interconnection would benefit the entire Reduced Rabbit Rock Service Area, increasing the reliability of the system by supplying the area by gravity rather than the current pump supply.

A 90 minute duration for the fire flow of 1,100 gpm requires a minimum storage capacity of 99,000 gallons. The existing standpipe serving the Reduced Rabbit Rock System has a 1 million gallon capacity, sufficient for this requirement. With the water system improvements proposed, the 13 billion gallon storage of Lake Gaillard would be added to this storage, thereby assuring adequate water for fire flows of any reasonably forseeable duration.

(4) Construction Related Impacts

Construction activities associated with providing water service to the Mall and the overall upgrading of service to the Reduced Rabbit Rock Service Area include:

- Installation of approximately 10,000 feet of 24-inch water main along Stillman Road, Valley Service Road, and Mall Drive, creating a new loop on the Reduced Rabbit Rock Service Area, including connections at Broadway and Washington Avenue.

- Installation of approximately 100 feet of 24-inch water main across Clintonville Road just east of Washington Avenue.

- Installation of some 7,500 feet of 24-inch water main along Elm Street and the Elm Street Extension, including connections to the 36-inch main on Sacketts Point Road and to the 16-inch main at the intersection of Elm Street and Broadway.

The impacts associated with these construction activities vary from place to place, but generally include: some disruption of normal traffic flow due to excavation and working in road areas, dust and dirt generated from excavation, and noise from construction equipment.

These impacts are temporary, occuring only during the installation. The intensity and duration of these impacts differ from area to area, as discussed below.

Stillman Road/Valley Service Road-Mall Drive

This area would experience no additional impact beyond that which would result from the widening of Valley Service Road and the construction of the Mall Drive, with the possible exception of the extension along Stillman Road and the connection points which may extend slightly onto Broadway and Washington Avenue. However, the extention and these connections would be made over a very short time period, probably less than a week.

Clintonville Road

The 100 feet of 24-inch pipe would cross Clintonville Road, causing some traffic disruption. However, since the connection is short, the installation

would take no more than one week. The road would not be closed as the installation would proceed from one side to the other, with only one-half of the road blocked at any time.

Elm Street

The Elm Street Extension is a planned street improvement not associated with the Mall. This street will run parallel to High School property to Sackett Point Road. The Company had indicated that it would install the water main in the sub-base of the road once it is in place. Since the construction would take place during the summer, no disruption of school activities are anticipated. No traffic disruption will occur as the street does not currently exist. However, short term traffic disruption may occur along the existing Elm Street and at the terminal points when the connections are made. The connections should take less than a week to complete.

There is a pond just west of the Elm Street extension as it passes the southern portion of the High School. The construction of the street has the potential to cause erosion, thereby impacting this water body. This impact should be minor, as an erosion control plan is required by the State of Connecticut.

Summary of Impacts

Providing water services to the Mall would have no impact upon the ability of the Authority to provide water to its customers even during periods of limited supply, and would not result in a measurable reduction in available

pressure to existing customers. Due to the adequacy of the excess in average supply capability in North Haven, there should be no impacts from other development in the town. System improvements would provide more reliable service to the Mall during fire flows. These improvements would also result in more reliable service to the Reduced Rabbit Rock Service area by providing gravity feed to the area now served through a pump station, and by adding a large volume of storage to the system. The impacts associated with construction required to provide water service to the Mall (i.e., disruption of traffic, noise, dust and dirt generation) would be limited in extent, as most construction occurs in off-road areas and away from active public areas, and would be of limited duration.

UNAVOIDABLE ADVERSE IMPACTS

The construction associated with providing water service to the Mall along Stillman Road/Valley Service Road, Mall Drive, Clintonville Road, Elm Street, the Elm Street Extension, and connections to be made at the intersections of Stillman Road and Broadway, Mall Drive and Washington Avenue, Elm Street and Broadway, and Sacketts Point Road and the Elm Street Extension would result in some disruption of traffic, noise, and dust and dirt generation. These impacts are limited, however, as most construction would not be in heavily utilized public areas and the duration would be short.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Providing water service to the Mall would result in the commitment of an average of 0.112 mgd of supply capability from other potential users.

As the supply available even during periods of limited supply exceeds current average demands by 32.8 mgd in the Authority's system, this commitment is judged not to be significant.

MITIGATING MEASURES

The impacts associated with supplying the Mall with water are those related to construction activities to install new water mains near the site, as well as at other locations in the Town of North Haven. These impacts would be mitigated through careful scheduling and a traffic control plan to minimize disruption of traffic, through good housekeeping methods to avoid dust and dirt problems, and by the application of an Erosion and Sedimentation Control Plan and scheduling to avoid impacts along the Elm Street extension. Exact measures cannot be ennumerated at this time, as the construction is the responsibility of the Town of North Haven for the Elm Street Extension, and the Authority for installation of the pipe.

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2. SANITARY SEWER FACILITIES

INTRODUCTION

The proposed North Haven Mall will require sewage disposal facilities for the sanitary wastewater generated by the stores and restaurants and a small quantity of cooling water. Potential impacts associated with providing sewage disposal service to the Mall, which are analyzed in this Appendix, may include:

1. Impacts upon the collection/transmission system (sewers), due to increased flows resulting from the Mall;

2. Impacts upon the sewage treatment facilities resulting from the increased flow and organic/solids loading from the Mall;

3. Water quality impacts due to the increased discharge of treated wastewater into the Quinnipiac River, and

4. Impacts associated with construction to provide sewer service to the Mall.

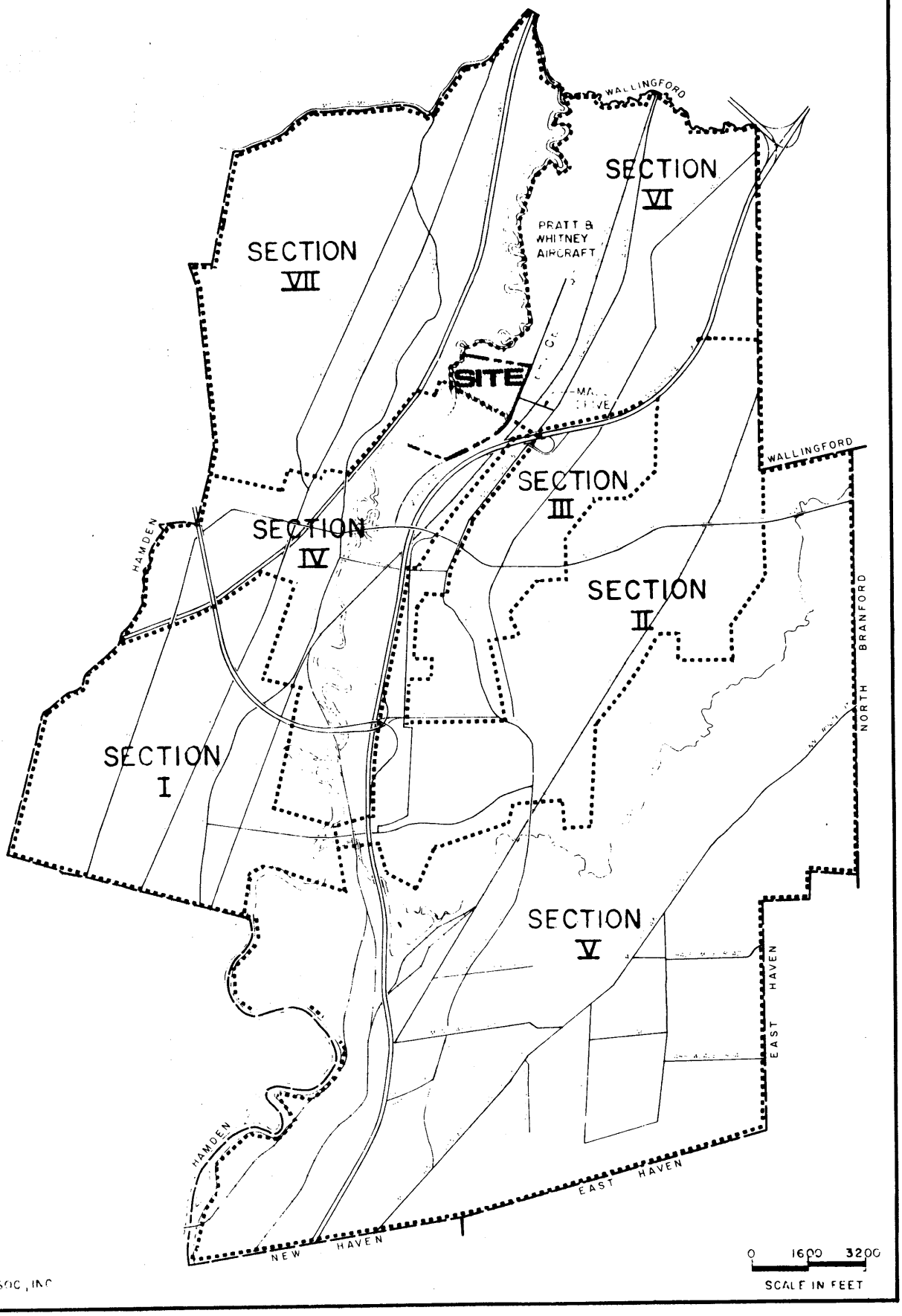
EXISTING CONDITIONS

Sewerage

Sewer facilities in the Town consist of seven separate sections, of which only a portion has been built to date (Figure 3). The municipal collection system in the Town began in 1964 with construction of laterals and interceptors in Section I to serve the southwest section of the Town. Section II, serving the east central section of the Town, and a portion of Section III serving the north central section of the Town, were constructed through 1973. Section V, serving the southeast portion of the Town was completed in 1980. Together, the existing sewer system serves approximately 65% of the Town.

The Town of North Haven is currently under orders from the State of Connecticut Department of Environmental Protection (DEP) to "construct sewers and necessary appurtences required to sewer the areas of the Town known as Section III and Section VI". This order (No. 2137, dated 27 September 1976) presents a schedule of activities to be performed by the Town.

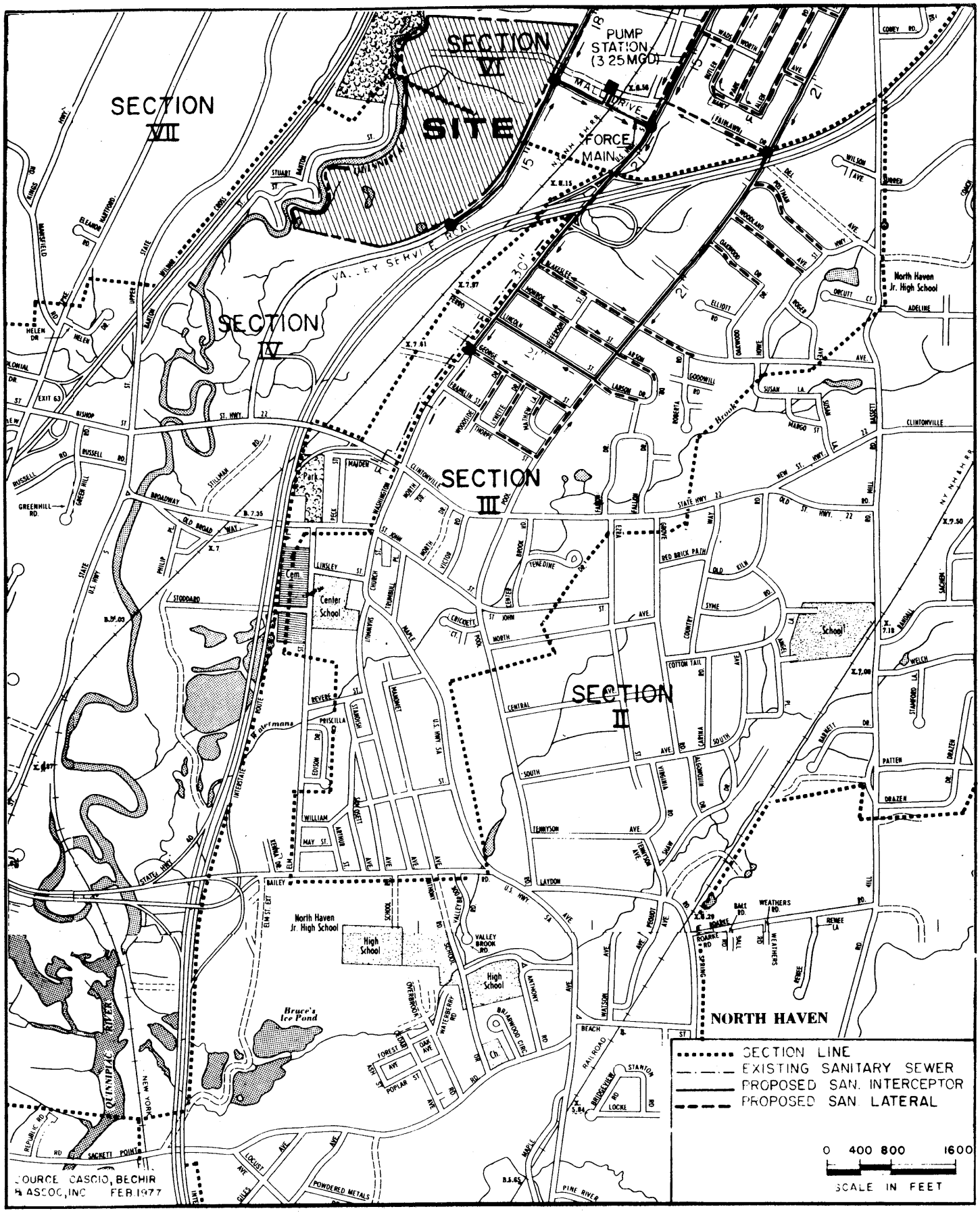
In accordance with the order, the Town had a facilities plan prepared by the firm of Cascio and Bechir Associates, Inc., North Haven, Connecticut. This plan, which was submitted to the DEP and United States Environmental Protection Agency (US EPA) in February 1977, recommended construction of sewers in Sections III and VI as shown in Figure 4. This facilities plan projected sewage flows for undeveloped industrial zoned land, excluding wetlands, at 1000 gallons per acre per day. The project flow from undeveloped industrial zoned land for sections III and VI was estimated at a 106,000 gallons per day in this report.



SOURCE
TASCO, BECHER & ASSOC., INC
FEB 1977

North Haven Mall
Valley Service Road
North Haven, Connecticut

Figure 3
Sanitary Sewer Collection Districts



North Haven Mall
Valley Service Road
North Haven, Connecticut

Figure 4
Existing and Proposed Sanitary Sewer Facilities

A second facilities plan (Water Pollution Control Plant Expansion, 1979, Cascio, Bechir & Associates, Inc.) states that a flow of 100,000 gallons per day may be contributed by the Mall to the treatment plant.

The sewer facilities were designed by CE Maguire, Incorporated, and an application for funding to construct the system was submitted to the DEP and US EPA in May 1979. To date, no funds for construction have been allocated for this project, since its priority ranking by the State of Connecticut DEP is low. According to the Town, funding for this project is not anticipated in the near future, unless there are changes in the allocation of funds to the states under the federal sewer construction grants program.

Sewage Treatment Plant

The sewage treatment plant serving the Town of North Haven was constructed in 1964. The plant is located on the west side of Terminal Road, south of Sackett Point Road, and next to the sanitary landfill. The treatment plant is a trickling filter plant with a design average flow capacity of 4.5 million gallons per day (mgd), and a process capacity of 6,135 pounds of five day Biochemical Oxygen Demand (BOD_5) per day and 6,200 pounds per day of suspended solids. The plant treats the wastewater by recirculating the sewage over a biologically active bed of stone and settling solids from the waste prior to discharge. Currently, the plant receives approximately 1.7 mgd. A summary of influent characteristics is presented in Table 2.

Table 2[1,4]

Wastewater Characteristics of

Town of North Haven Sewage

Treatment Plant Influent

Year	Average Flow (mgd)	Suspended Solids (mg/l)	Suspended Solids (#/Day)	BOD_5 (mg/l)	BOD_5 (#/DAY)
1974	1.11	326	3018	465	4305
1975	1.15	333	3192	356	3414
1976	N.A.	N.A.	N.A.	N.A.	N.A.
1977	1.30	234	2537	337	3654
1978	1.50	226	2827	171	2139
1979	1.71	186	2653	237	3380
1980*	1.68	145	2032	232	3251

* 7 months

The range of flow experienced at the sewage treatment plant is from 0.5 to 4.0 mgd (1979 records). This compares to a design range of 2.32 to 8.10 mgd. The plant, therefore, has adequate hydraulic capacity for both average and peak flows experienced.

The treatment efficiency achieved by the Town sewage treatment plant is presented in Table 3 for the years 1975 through (July) 1980. The required treatment efficiency, as contained in the National Pollution Discharge Elimination System Permit No. CT0100404, dated 30 December 1974 and modified 8 September 1978, requires 85 percent removal of BOD_5 and suspended solids, with a monthly average maximum concentration of 45 mg/l or less for each constituent.

Table 3

Treatment Efficiency of

the Town of North Haven Sewage

Treatment Facility

(Yearly Averages)

Year	BOD_5			SUSPENDED SOLIDS		
	Influent (mg/l)	Effluent (mg/l)	Percent removal	Influent (mg/l)	Effluent (mg/l)	Percent removal
1975	358	32	91	333	26	92
1976	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1977	337	40	87	234	29	87
1978	171	40	76	226	31	87
1979	237	63	73	186	28	85
1980*	232	73	68	145	26	82

* 7 months

Examination of the treatment plant performance shows that the plant is not achieving its permit limits for percentage removal of BOD; however, the total pounds of BOD_5 discharged is below the monthly average of 1716 pounds specified in the permit. Typically, the trickling filter process is not capable of achieving the 85 percent BOD_5 removal requirements. In winter the efficiency reduces further due to the temperature dependency of biological treatment systems. Because of the inherent low efficiency of the trickling process, the 1977 facilities plan examined upgrading of the treatment plant, and recommended upgrading to provide additional treatment.

A detailed analysis of the need for upgraded treatment was prepared by Cascio and Bechir Associates, Inc. in their report, "Town of North Haven, Connecticut: Step I, Facilities Plan, Water Pollution Control Plant Expansion (1979)." This plan recommended upgrading of the treatment plant to meet permit conditions. An application for a grant to design and construct the treatment plant improvements is on file with the Connecticut DEP and US EPA. US EPA funding is not anticipated until 1986, with start-up of the upgraded plant anticipated in late 1988 or early 1989.

Water Quality

A detailed examination of water quality in the Quinnipiac River is presented in Appendix C: Surface Water Resources and Water Quality. The Quinnipiac River is classified by the Connecticut DEP as Class C, from the Southington treatment plant down to the tidewater. This classification indicates that the waters have good aesthetic value and are suitable for fish and wildlife habitat, recreational boating and for certain industrial processes and cooling. Currently, the River violates certain criteria associated with this classification, specifically coliform and dissolved oxygen. The Connecticut DEP has reported that the major causes of local water quality criteria violations are sewage discharges emanating from municipal treatment facilities at Southington, Cheshire, Meriden, Wallingford and North Haven; and some 25 industrial discharges totaling 10.7 mgd (including approximately 5 mgd from the Upjohn and American Cyanamid Companies). Additionally, storm water discharges from urban and industrial areas contribute to the water quality characteristics of the Quinnipiac River.

PROPOSED ACTION

Water use by the Mall has been conservatively estimated elsewhere in this Appendix at 112,000 gallons per day, with a peak rate of flow of 560,000 gallons per day (389 gallons per minute). It is assumed, for the purpose of this analysis, that the sewage flows would be 90 percent of the water demand. This reduction in flow accounts for consumptive uses of water, especially restaurant use, landscape watering during summer months, and cooling water evaporation, which do not enter the sewer system. Typically, on a system wide basis, sewage flows are only 60 to 70 percent of water use. The resulting sewage flow is, therefore, conservatively estimated at approximately 100,000 gallons per day with a peak rate of flow of approximately 500,000 gpd (350 gpm).

Sewage generated by the Mall would be discharged into the sewer system for treatment at the Town's treatment plant. The effluent from the Mall would leave the site, connecting to the planned Town sewer along Valley Service Road. The Valley Service Road sewer is in Section VI of the Town sewer system, one of the sections awaiting funding from the US EPA. However, an agreement between the Developer and the Town stipulates that the Town would provide sewer service to the Mall. It is anticipated that the Town would install a portion of the proposed sewers along Valley Service Road and connect them to a pump station which would be located near the proposed Mall Drive. A force main would then carry the sewage to proposed and existing interceptors along Washington Avenue for conveyance to the Town treatment plant.

The sewage generated by the Mall would be of similar composition as typical domestic sanitary sewage. Some air conditioning cooling water blow down (9 to 10 gallons per minute) would be included, which could contain chemical corrosion inhibitors. These corrosion inhibiting chemicals are usually used in all large open recycle water cooled central air conditioning. The exact nature of the chemicals that would be used is not known; however, 200-500 parts per million of sodium chromate is typically used. Considering the low flow (9 to 10 gpm at peak air conditioner use), and the dilution available before entering the treatment facility (125 times at average STP flow), there should be no interference with the treatment process. These chemicals are removed in the treatment process prior to discharge.

IMPACT ASSESSMENT

The Town sewers which would serve the proposed Mall are in Section VI of the sewer system. These sewers are planned for installation but have been delayed pending available funding by the US EPA. The effect of the Mall would be to accelerate the installation of a small portion of the planned Section VI.

(1) Collection/Transmission System

The proposed method for connecting the Mall to the existing Town of North Haven sewer system would be to install a portion of the planned 15-inch diameter sewer along Valley Service Road to a 24" interceptor and pump station. The sewage would then be pumped to a 21" and 30" diameter interceptor now located along Washington Avenue which would be connected to an existing

24" interceptor at George Street. The interceptor is part of the Elm Street interceptor sewer which, according to the 1977 facilities plan, has an hydraulic capacity ranging from 6.51 to 9.88 mgd. This interceptor has a limited capacity of 7.58 mgd in the portion from Marlin Fire Arms to Bailey Road. Although the flow capacity in this section of the Elm Street interceptor may be exceeded when Sections III and VI are fully developed, the 1977 facilities plan indicates that the sewer would perform satisfactorily with a surcharge of approximately 4 inches.

The 1977 facilities plan projected sewage flows for industrially zoned land at 1000 gallons per acre per day. A total flow from industrial zoned land in section III and VI was projected at 106,000 gallons per day. The sewage flows estimated for the Mall (100,800 gallons per day) would be less than that planned for in the Facilities Plan; therefore, no significant impact upon the collection system would occur. This judgment is supported by the fact that consumptive uses were estimated at 10 percent of water use compared to the reported 30 to 40 percent for water systems.[5]

(2) Treatment

The addition of the conservatively estimated sewage flow of 0.1 mgd to the current (1980) average flow of 1.68 mgd would be a 6 percent increase in flow to be processed, and would constitute 2.2 percent of the process design capacity of the plant.

To assess the impact of the additional flow and organic load generated by the Mall upon the treatment efficiency of the existing treatment facility,

both empirical and semi-empirical methods were used. The National Research Council (NRC) has developed a formula for trickling filter treatment efficiency (BOD_5 removal) based upon the operating records of these types of plants in the 1940's. A second method used to predict treatment efficiency is the empirical relationship of organic load and process efficiency developed by the Great Lakes Upper Mississippi River Board of State Sanitary Engineers (GLUMRB).

The addition of the flow and corresponding organic load to the Town STP from the Mall would marginally reduce the operational efficiency of the plant. Based upon the above mentioned methods, the predicted reduction in percentage efficiency would be 0.5 percent, based upon the NRC formula, and 0.6 percent based upon the GLUMBR relationship. Using the more conservative 0.6 percent reduction and the current efficiency of the North Haven STP, there would result a predicted efficiency of 67.6 percent. This prediction does not account for any additonal reduction in plant efficiency that might occur for reasons unrelated to the Mall. In terms of additional BOD_5 load to the Quinnipiac River, the Mall would produce an incremental load of 94 pounds of BOD_5 per day, with the treatment plant discharging a total load of 1,134 pounds per day.

Pursuant to the Town STP's NPDES Permit No. CT 0100404, the plant is limited to a discharge of 1,716 pounds per day of BOD_5, with a concentration not to exceed 45 mg/l and a removal efficiency of at least 85 percent. With the addition of the Mall sewage flows, the plant would meet the mass limit but would continue to contravene the concentration and removal efficiency limits for BOD_5 during the winter months of the year until the upgraded facility is operational.

For suspended solids, the plant met all criteria, except for removal efficiency, in 1980. The addition of the Mall sewage load should not cause any significant change in suspended solids removal, as the removal of solids is much less sensitive to small flow changes than the biological units, particularly at less than design flow.

Coliform reduction by chlorination would meet the design disinfection time of 15 minutes after addition of the Mall flow, as the total flow to the plant with this addition would be well below the design average flow of the plant.

(3) Water Quality Impacts

Any impacts of disposal of sanitary sewage generated by the Mall upon water quality in the Quinnipiac River would result from an increased organic (BOD_5) load. The total organic load from the town plant was projected, including consideration of slightly diminished efficiency due to the Mall sanitary sewage flow, at a total of 1,134 pounds of BOD_5 per day. This represents an increase of 94 pounds per day over the existing condition. The total load is less than the permitted mass load for the treatment plant of 1,716 pounds of BOD_5 per day.

The Quinnipiac River is classified by the Connecticut DEP as water quality limited, meaning that if all point sources meet the requirement of "Best Practical Treatment," the river will still not meet water quality standards. Under these conditions, the NPDES permits reflect the degree of treatment required of each point source in order to meet water quality standards.

Since the North Haven STP permit requires standard secondary treatment (85 percent removal of BOD_5 and suspended solids, with a maximum monthly average concentration of 45 mg/l for each constituent), this effluent allocation reflects the degree of treatment deemed necessary by the DEP to achieve water quality standards.

Although the North Haven STP is not achieving the permit limit of 85 percent removal some of the time, and in the case of organic load (BOD_5) the concentration limit of 45 mg/l, the plant is meeting, and would meet with the addition of the Mall sewage, the maximum load limit of 1,716 pounds per day, which is the basis for water quality determinations. This results because of the low flow currently being treated at the plant. The plant and the permit limits are based upon a design average flow of approximately 4.5 mgd compared to the 1.7 mgd currently processed and the 1.8 mgd with the proposed Mall flows. Therefore, with the existing trickling filter plant, the effluent should not cause contravention in water quality standards in the Quinnipiac River, with or without the Mall, through the period preceding the upgrading of the plant.

The above analysis is conservatively based upon the full sewage flow from the Mall being achieved at its opening in 1983. The Mall is scheduled to open in late 1983 when approximately two-thirds of the space would be occupied. Full operations are expected by the end of 1985. Additionally, as is common with projects of this type, retail productivity for the center is not expected to be reached until 3 to 5 years after opening. Therefore,

the full sewage load from the Mall would not be experienced until sometime in 1987-1988 and any impacts upon water quality would be of short duration (1 to 2 years) until the upgraded treatment facility is operational.

Based upon the preceding information, the sewage flows and subsequent pollution loads to the Quinnipiac River are not expected to cause contravention of water quality standards.

(4) Construction Related Impacts

Construction impacts related to the provision of sewage disposal service at the Mall include:

- o On site installation of sewers to convey sanitary sewage to the Town sewer system;

- o Construction of portions of Section III and VI of the planned Town sewer expansion, including a portion of the 15-inch diameter sewer along Valley Service Road to Mall Drive, the 24-inch diameter sewer along Mall Drive from Valley Service Road to the planned pump station, and the force main from the Mall Drive pump station to a planned 21" and 30" interceptor along Washington Avenue to the 24-inch diameter Elm Street interceptor at George Street and Washington Avenue. These impacts would have occurred without the Mall; the Mall would merely accelerate their occurance.

Impacts related to this construction include noise, dust and dirt generation due to excavation, and some traffic disruption along utilized streets.

Since the majority of construction would take place simultaneous to the widening of Valley Service Road and construction of Mall Drive, the impacts of this activity would be the same as for this construction. Making the connection to the Elm Street interceptor at George Street would represent new construction in an area not being worked on for other Mall-related improvements. This connection would result in trenching across Washington Avenue and along the west side of this road from Mall Drive to George Street. Since this sewer is a part of the Sections III and VI sewer expansion program, it would have taken place without the Mall. The Mall's effect is to cause this construction to take place earlier than would otherwise occur if the Town waited for a construction grant from the US EPA for this portion of the sewer system.

The installation of the interceptor along Washington Avenue simultaneous with other Mall-related construction in this area would have positive effects, because once the sewer was in place, the street would not have to be disturbed again when Sections III and IV are built in this area in accordance with the outstanding DEP order.

Cumulative impacts from other development in the town of North Haven are considered in the 1977 and 1979 facilities plan and consist of increased sewage flows experienced in the collection system and treatment plant. Over the period 1980 to 1990, during which the existing treatment plant would treat sewage generated by the Mall, population is projected in the 1979 facilities plan to increase by 5 percent in the town. If there are no new sewers constructed

during this period (EPA funding for sewers is not available), the cumulative impact upon the Towns sewage facilities would be an increase in flow from the 1980 average of 1.70 mgd to 1.78 mgd without the Mall and from 1.80 to 1.89 mgd with the Mall. This would cause no significant impact to the collection or transmission system and would result in a very small increment to the organic load discharged to the Quinnipiac River. The total organic load considering cumulative impacts would still be well below the permit limit of 1716 pounds per day and, therefore, not cause contravention of water quality standards in the Quinnipiac River.

Secondary development due to the Mall construction would be centered upon the area east of the Valley Service Road and along Washington Avenue. It has been estimated that along Washington Avenue, more intensive use of existing sites may occur while along Valley Service Road new facilities may be developed. It is projected that over the first 10 years after the opening of the Mall, approximately 40 percent of the available 60 acres (24 acres) might be developed for office or retail services. This could result in an increase in sewage generation of a maximum of 24,000 gallons per day in Sections III and VI. This small increase would have no significant impact upon the efficiency of the treatment plant even if the development were accelerated to occur before the upgraded facility were operational in 1988 or 1989. The additional flow to the Elm Street interceptor may cause a very minor increase in the surcharge which would be experienced if sewage flows reach the ultimate projected quantities.

Summary of Impacts

Providing for sanitary sewage disposal service to the proposed North Haven Mall by the Town of North Haven sewage disposal facilities would:

- Not significantly impact the hydraulic characteristics of the collection/transmission system beyond that planned for by the Town in its facility plan;

- Cause a temporary minor impact upon the efficiency of the Town sewage treatment plant during the period from the opening of the Mall until the upgraded treatment plant is operational, sometime in late 1988 or early 1989;

- Cause no contravention of water quality standards in the Quinnipiac River;

- Cause temporary limited impacts related to construction along Washington Avenue from Mall Drive to George Street including noise, dust and dirt generation and limited traffic disruption, some of which constitute an acceleration of Town plans for sewer installation.

UNAVOIDABLE ADVERSE IMPACTS

The connection of the proposed Mall to the Town of North Haven sewage facilities would result in the following adverse impacts:

1. A temporary minor reduction in the treatment efficiency of the Town treatment plant for the period from late 1983 through late or early 1989, when the upgraded treatment plant is scheduled to be operational.

2. Temporary noise, dust and dirt generation and limited traffic disruption during construction of a portion of Sections III and IV of the planned Town sewer system expansion, which would occur earlier than planned because of the proposed Mall.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Commitment of resources associated with providing sewage disposal service to the proposed mall would include an earlier use of materials required to construct the portions of Sections III and VI of the Town sewage system, and the commitment of a maximum of 0.1 mgd of sewer treatment plant capacity and, consequently, of a portion of the Quinnipiac River's capacity to assimilate water. The sewer system expansion would be expected to occur at a later time without the Mall, while the sewage treatment plant and river's assimilative capacity would be reserved for future development of the Mall property at the same approximate level as the Mall would generate.

MITIGATING MEASURES

Mitigating measures to minimize impacts resulting from provision of sewage disposal service to the Mall would include construction sequencing of the sewer system improvements to coincide with other construction and

thereby limit the duration of impacts; good housekeeping to minimize dust and dirt generation; limits on the time during which construction may proceed to minimize noise impacts during construction, and preparation and execution of a traffic control plan to minimize traffic disruption.

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3. SOLID WASTE COLLECTION AND DISPOSAL

INTRODUCTION

The proposed North Haven Mall would require solid waste collection and disposal services. The potential impacts associated with providing these services would be:

1. Impact upon the collection services of others due to the additional solid waste load,

2. Impact upon the disposal area (sanitary landfill) due to increased loads, and

3. Noise, dirt and traffic impacts due to the collection and transportation of solid wastes.

EXISTING CONDITIONS

Solid waste collection for commercial and industrial facilities in the Town of North Haven is provided by private carting companies which dispose of the solid waste at various landfill facilities in the North Haven region, including the Town landfill. The Town owns and operates a sanitary landfill located next to the Town sewage treatment plant (south of Sacketts Point Road and west of Industrial Drive). At current disposal rate this solid waste facility is projected by the Town of have a useful life of 2 to 2½ years (as of June 1980). The Town has applied to the State of Connecticut

for a permit to expand the landfill. This expansion would extend the life of the landfill for 2 to 3 years or until 1984 or 1985.

The Town has indicated that it is studying alternatives for solid waste disposal, including a potential new landfill immediately south of the existing facility and the use of the City of New Haven's transfer station for transportation of solid waste to landfills outside of the Town. The long term solution for solid waste disposal, according to the Town, lies in participation in the Connecticut Resource Recovery Authority's project for South Central Connecticut. Potential sites for resource recovery facilities include the Upjohn plant in North Haven and the American Cyanamid plant in Wallingford.

The Town currently disposes of between 24,000 and 26,000 tons per year of solid waste (as weighed at the Towns sanitary landfill). This solid waste includes commercial wastes as well as domestic garbage.

There are currently 10 commercial carters which utilize the Town landfill. These are:

A.J. Carting - 416 Blacks Road, Cheshire

Bozzuto Carting - 12 Soffer Place, Branford

Dee's Inc. - P.O. Box 5102 Hamden

DiMartino - 109 Pond Hill Road, North Haven

Hammie, Nathaniel - 27 Giles Avenue, North Haven

John's Refuse Removal - Lanes Pond Road, Northforce

Latella Carting - 85 Prindle Road, West Haven

Perrotti Brothers - 136 Bradley St. Woodbridge

Royal Carting - 41 Rose Hill Road, Branford

Tobacco Valley Sanitation - BOX 302 So. Windsor

PROPOSED ACTION

Based upon the operating experience of other regional malls and department stores, the proposed North Haven Mall with 1.12 million square feet of gross leasable area would generate a total of 3261 tons of refuse per year without recycling. At least one of the Mall department stores, however, would recycle 85% of its refuse generation in the form of paper and plastics recovery. The techniques utilized (source separation of paper and plastic from general garbage) are applicable to the other department stores and the Mall shops, and could reduce the total refuse to be disposed of to less than 500 tons per year--less than 2% of that currently generated in the Town. Thus, the range of refuse to be disposed of is estimated to be between 500 tons per year if all stores practice recycling, and 3077 tons per year if only one department store practices recycling. The carter(s) that would collect and dispose of this solid waste are unknown at this time; therefore, the location for disposal is unknown. Since no hazardous or toxic wastes would be generated, there would be no restrictions on potential disposal areas.

IMPACT ASSESSMENT

Collection Impacts

Since collection is by private carters, there would be no impact upon the level of service to residents of the Town due to the additional waste. There may, however, be impacts associated with the pickup and transportation of solid waste, most notably noise. Since the Mall would not be located near residences, and would be well buffered from adjacent areas, noise associated with pickups would not impact residents.

Transportation of solid waste from the Mall to an ultimate disposal site would result in very minimal additional truck traffic on major roads serving the Mall. Since refuse collection from commercial activities would occur during evening or early morning hours (off peak traffic periods) there would be no significant traffic impact associated with pickup or transportaton of solid waste. Although transportation would occur during sensitive time periods, the trucks would utilize major transportation corridors, the Mall area would be well buffered and, therefore, noise would not significantly increase over existing conditions.

Disposal Impacts

Disposal of solid waste generated by the proposed North Haven Mall could be achieved in any location in the North Haven region, depending upon the carter(s) contracted by the department stores and Mall. The quantity to be disposed of would be between 500 and 3077 tons per year

depending upon the level of recycling practiced at the Mall. This would represent an increase of refuse disposal in the Town of between 2 and 13 percent. In the worst case, all of the refuse would be disposed of in the Town landfill. Considering that the Mall would open two-thirds of their facilities in 1983, with full operations beginning in 1985, and that full productivity would not be achieved for 3 to 5 years after opening, the full solid waste load would not occur until 1988. Since even with the proposed expansion the Town landfill would be filled by 1985 at the latest, the Mall would not have any significant impact upon the need of the Town to implement alternative solid waste management arrangements.

In the long term, with participation in the proposed resource recovery project by the Town, the additional solid waste from the Mall, estimated at between 2 to 13 percent of the Town total, would not represent a significant impact. This assessment is based upon consideration of the characteristics of the Mall solid waste, volume and cost. The Mall solid waste would have a high cellulose content (70 percent compared to 55 percent for domestic solid wastes) and, therefore, a high heat value. Thus, if recycling was not practiced, the waste would be valuable from an energy recovery standpoint. If recycling was practiced, the small volume (500 tons per year) would not impact a resource recovery facility. In either case, the cost of disposal will be fully paid for through tipping fees and would have no fiscal impacts upon the Town of North Haven.

Cumulative impacts, associated with growth of solid waste generation in the town, and secondary development attributable to the Mall, would

occur over a long time period (10 years or more). Therefore, these factors would not impact upon the time frame in which the Town must resolve its long term solid waste disposal problem.

UNAVOIDABLE ADVERSE IMPACTS

Solid waste collection and disposal from the proposed North Haven Mall would result in no impact upon the current level of collection in the Town of North Haven. Because collection occurs at off peak hours, no significant traffic impacts would result. Noise impacts associated with the collection and transportation of solid waste would not be significant because of the distance from the Mall to residential areas, the buffer between the Mall and adjacent areas, and the use of already heavily trafficked roads to reach disposal sites.

The impacts of disposal would depend upon the level of recycling practiced at the Mall and the location and method of ultimate disposal. Because the Mall would not be fully operational when the Town landfill is projected to close, the Mall would not impact significantly upon the Town need to find alternative solid waste disposal methods. In the long term, with the Town's participation in a regional resource recovery project, the addition of the Mall solid waste would not have a significant impact because of high heat value of this material if recycling was not practiced, and small volume if recycling was practiced.

INREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The disposal of solid waste from the proposed North Haven Mall would commit from 2 to 13 percent of landfill space used by the Town of North Haven.

MITIGATING MEASURES

The institution of recycling by both the anchor department stores and Mall shops would result in an estimated 85% reduction in solid waste to be disposed of. This would reduce the impact of Mall generated solid waste.

4. ELECTRICAL SUPPLY AND DISTRIBUTION

INTRODUCTION

The proposed North Haven Mall would require electrical services for lighting, air-conditioning, hot water heating and miscellaneous equipment. Possible impacts associated with providing this service are:

1. Impact upon the electric utility company to dependably supply power to all customers during periods of peak demand,

2. Impact due to construction to provide primary power distribution to the proposed site, and

3. Impact associated with connection of the site electrical distribution system to the utility lines.

The magnitude of these impacts, if any, are analyzed in the following sections.

EXISTING CONDITIONS

Electricity is supplied in the Town of North Haven by United Illuminating (UI). UI supplies electricity to 17 southeastern towns in Connecticut with a total population of approximately 727,200 or 23% of the population of the State of Connecticut. UI generates power at five stations as follows:

Steel Point - Bridgeport	67,000 kilowatts (kw)
English - New Haven	75,000 kw
Bridgeport Harbor	686,000 kw
New Haven Harbor (UI Share)	418,860 kw
Connecticut Yankee (UI Share)	55,100 kw
Total generating capacity	1,299,360 kw

Additional electrical capacity is obtainable through UI membership in the New England Power Pool. Planned additions to UI owned capacity include 42,400 kw from the Millstone Nuclear Plant Unit 3, scheduled to be operational by 1986; 37,900 kw from the Pilgram Station Unit 2, scheduled to be operational in 1986; and 460,000 kw from the Seabrook Station Units 1 and 2, scheduled to be in service in 1983 and 1985.

Total electrical demand from the UI service area for 1979 was 4,780,751,000 kilowatt-hours with a peak demand of 911,300 kw. This represented an increase in overall usage of 1.5% over 1978, but a decrease in peak demand of 4.4%. The all-time peak demand on the system was 952,900 kw in August 1978.

PROPOSED ACTION

Electric demands for various uses at the proposed Mall are discussed in detail in Appendix P: Energy. The total peak electrical demand would be 11,000 kilowatts, with annual usage estimated at 30,550,000 kilowatt-hours. There is currently high voltage electric service located along the railroad

right-of-way east of the Valley Service Road. The proposed service for the Mall would consist of bringing this high voltage service to Valley Service Road by overhead lines, crossing under Valley Service Road to primary switch gear on the site and running a high voltage loop around the Mall building, with secondary service taken from this loop and stepped down to a lower voltage by eight secondary transformers located at various points around the Mall.

IMPACT ASSESSMENT

(1) Impact of Mall Demand Upon Utility Supply

The peak demand of the Mall, estimated at 11,000 kw, would represent 0.8 percent of the total generating capacity of the UI system. Together with the 1979 peak, this demand would leave a total reserve capacity of supply over demand of 377,060 kw, or 29 percent of system generating capacity. Considering the all-time system peak, the addition of the Mall demand would still leave a reserve capacity of 334,460 kw, or 25.7 percent of system capacity. Therefore, the additional electrical demand from the Mall would have no impact upon the ability of UI to supply electricity to its customers, even under peak load conditions.

(2) Construction Impacts Due to Supplying Primary Service

Supplying primary service to the Mall would require extension of high voltage service along the railroad right-of-way just east of the Valley Service Road to the Mall site. This would be accomplished by overhead lines for the

short distance to the Valley Service Road, then by underground cable to the main switchgear on the Mall site. Since this construction would occur simultaneous with improvements to the Valley Service Road, no incremental impacts would occur. The connection would be made with no disruption of service to existing customers.

(3) Impacts Due to Connection to Utility

Connection to the UI underground high voltage service would be via an underground conduit from Valley Service Road to a primary transformer and switchgear located on the site. Since Valley Service Road is not a through street and during the period that the connection would be made the road would be widened, no additional impact associated with installing the conduit to provide primary electric service to the Mall is anticipated.

UNAVOIDABLE ADVERSE IMPACTS

Supplying electrical service to the Mall would have no identified unavoidable adverse impacts.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Providing electric service to the Proposed North Haven Mall would represent a commitment of 11,000 kw peak demand upon the United Illuminating generating capacity. This represents 0.8 percent of the 1979 system capacity.

MITIGATING MEASURES

The connection of the North Haven Mall to existing high voltage service along Valley Service Road would involve some construction which would take place simultaneous with widening the road. To mitigate any adverse impacts associated with this construction, responsible construction practices would be exercised as described under construction impacts elsewhere.

5. TELEPHONE SERVICE

Telephone service to the Proposed North Haven Mall would include public telephones and service for the stores and department stores. Service is provided by Southern New England Telephone. The telephone lines would be brought in from Washington Avenue along Mall Drive and Valley Service Road to the Mall site. Construction would be required along these roads to install the appropriate conduits, manholes, etc. to provide service. This construction would occur simultaneous to other improvements in the area and, therefore, would not cause significant incremental construction impacts.

According to Southern New England Telephone, service to other customers would not be interrupted during the installation of telephone service to the Mall.